IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication NOVEMBER 10, 1960

★ Ford's Kucher and Dykstra Stress:

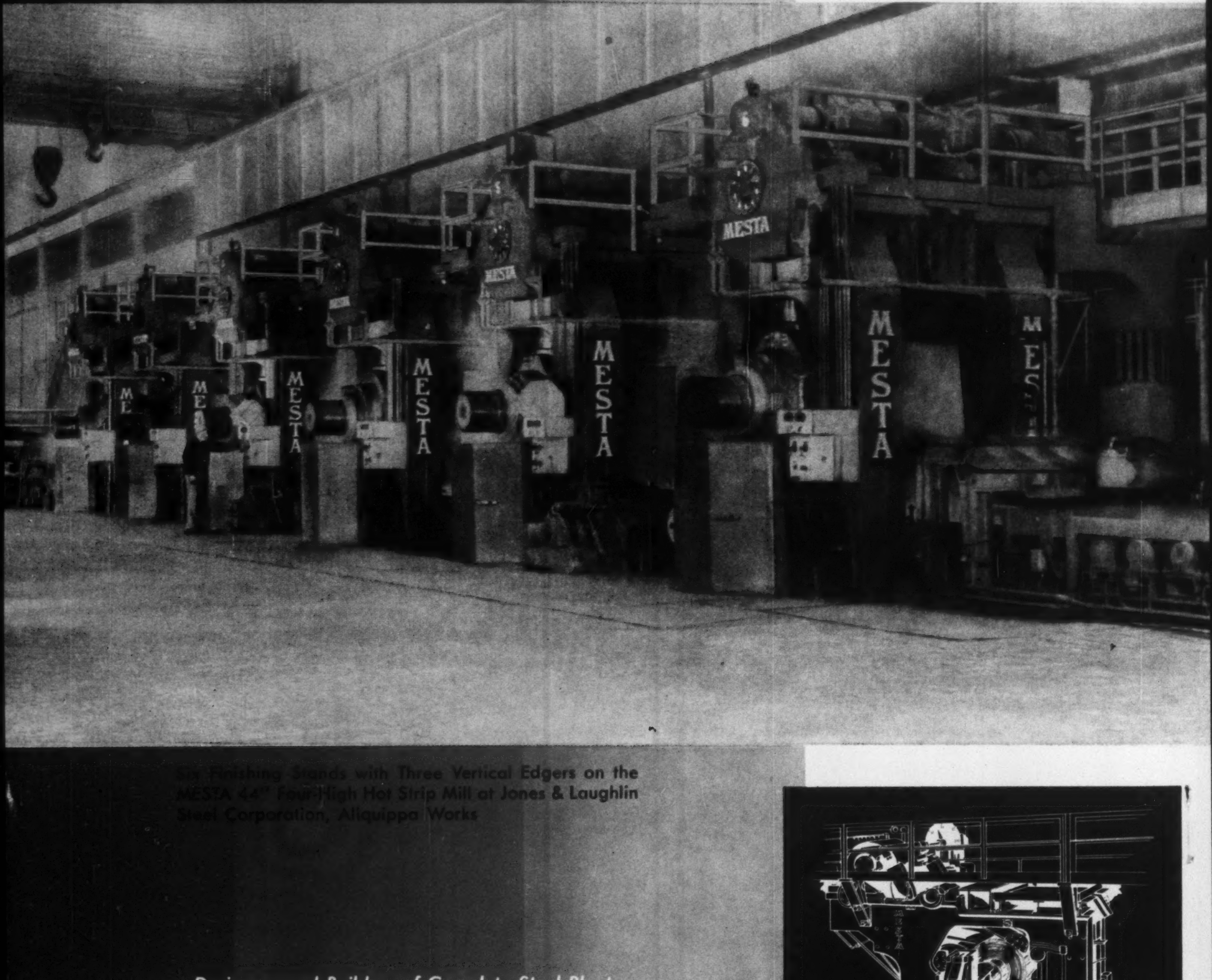
Buyer Demand For Greater Reliability p. 131

How to Avoid Blunders Abroad p. 137
New Metal-Graphite Bearings p. 171
Digest of the Week p. 2-3

HOT STRIP MILLS

DESIGNED AND BUILT BY

MESTA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Six Finishing Stands with Three Vertical Edgers on the MESTA 44" Four-High Hot Strip Mill at Jones & Laughlin Steel Corporation, Aliquippa Works

Designers and Builders of Complete Steel Plants

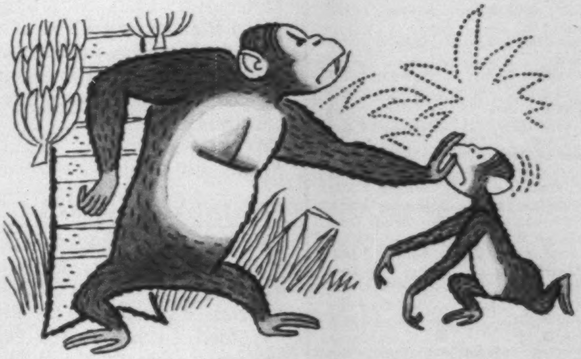
MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

The Chimp who turned out to be a Chump

Once, in a far-off tropic land, there lived a chimpanzee named Charlie. His home was a banana tree. And you'll have to admit, that's a pretty shrewd place for a chimp to live.

One day Charlie spotted a huge bunch of ripe bananas, washed up on the beach by the incoming tide. He rushed from his tree and spent the next few weeks living a life of ease.



All too soon the treasure was gone. Not only that, but Charlie found that his old tree had been taken over by an ape with large teeth and a nasty disposition.

So now Charlie squats sadly on the shore. He peers anxiously towards the waves, waiting in vain for another treasure on another tide.

Whether your needs be bananas or steel, your safest, most reliable suppliers are right here at home. Remember, no one knows the needs of American steel buyers better than American steel makers. To serve you, and serve you well, is our primary concern—not just today and tomorrow—but year after year.

Isn't it reassuring to know the steel you buy is made by old and proven friends? It's steel of certified analysis, meeting appropriate specifications. You can rely on Bethlehem Steel for a wide range of standard and specialty products. And remember, our engineers are on call to help you solve your steel-working problems.

Isn't it time to place an order for your next steel requirement with Bethlehem?

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The IRON AGE

November 10, 1960—Vol. 186, No. 19

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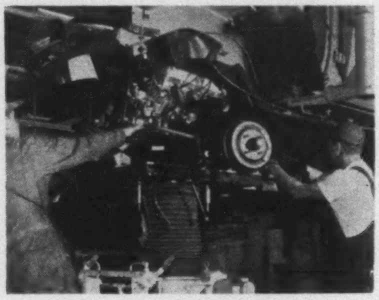
News of the Industry

ALUMINUM ENGINES

General Acceptance—Major engine builders are carefully eyeing the aluminum engine. Its acceptance is now practically assured by all builders except those who need engine weight such as ships and trains. P. 134



DIECASTING

By Ear—Diecasters are planning 1961 spending, but are playing it by ear. They want to see what business offers before they lay out a big supply of cash. P. 135

GM'S MOTORAMA

Bet a Billion—GM will spend $1.25 billion in 1961 for machinery, facilities, and tooling new models in the U. S. and 19 foreign countries. It's the largest amount the company has ever programmed for a single year. P. 136

REPORT ON EUROPE

Avoid Mistakes — This fourth

Metalworking

Cover Feature

TOUGH TEST—John Dykstra (r), Ford vice president, Mfg., and Dr. Andrew A. Kucher, vice president, Engineering & Research, check vibration test on new Ford. Auto companies stress reliability to meet demands of today's market. P. 131

part of a series points out 10 mistakes often made by businessmen in their European operations. They are points to watch when dealing overseas. P. 137

HOW MEN WORK

Industry Does Research — Both science and business are trying to find out how the human body acts as a work machine. Some progress has been made, but more is needed to find the answers. P. 138

Engineering-Production Developments

NEW METAL GRAPHITES

Handle Bearing Jobs—Anti-friction properties and strength are combined in a new family of metal-bonded graphites. Key to the development is a process which prevents "sweating" during sintering. The newcomers can serve in both dry and lubricated bearings. P. 171

SUPPRESS EXPLOSIONS

When Safeguards Fail — Explosions cause more than $100 billion in losses every year in the United States. Most efforts to reduce these losses are passive. A new system takes the offensive for the first time. It acts within a few thousandths of a second to snuff out blasts before destruction can occur. P. 174

MOVING CHAINS

Speed Forming Line — In constant motion, silent- and roller-type chains remove major bottlenecks from an automaker's hood-fabrication line. By replacing shuttles, these chains have reduced production costs 25 pct. And they insure better fitting hoods. P. 176

METALS PLUS PLASTICS

Delay Fatigue and Corrosion—All parts that go into helicopter blades must withstand rough endurance tests. Finished blades rely on many metals, plastics and adhesives for design superiority. P. 178

CHECK WELDED TUBING

For Hydraulic Lines — Overly-conservative buyers prefer seamless tubing in their hydraulic systems. Welded tubing for this use is still fairly new. However, it's just as strong as seamless tubing—and it's far less costly. P. 180

Market and Price Trends

JAPANESE UNIONS

More Strength—Japanese labor leaders are touring Chicago to learn how U. S. unions operate. They plan to take back their knowledge to help build stronger and more unified unions in Japan. P. 139

MACHINE TOOLS

Show Business — Machine tool builders say business generated by the tool exposition should start to show up in new orders to be placed in November and December. P. 149

STEEL SUMMARY

Marking Time—There are no outstanding factors working in the market. Some automotive slack has been picked up in other lines to keep orders at a level flow. Steel companies themselves are cutting or leveling out their own inventories. This may mean lower operations in the next few weeks. P. 235

PURCHASING

New Data—A new steel casting book just published has been designed for readership by castings users and potential customers. It should prove a handy reference guide to purchasing agents. P. 236

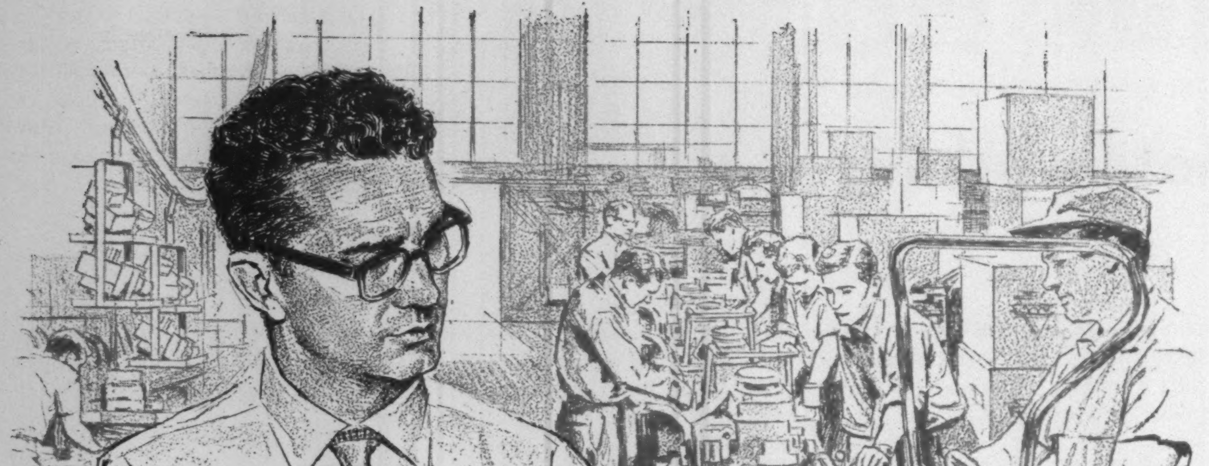
NEXT WEEK

THE AFTERMATH

Next week The IRON AGE will give the reactions of top metalworking executives to the newly elected president. One important question asked: Will the new administration be able to take action that will prevent a recession.

MACHINE HONEYCOMB

Quenched-Arc Cutting—With no teeth, an electro-band saw cuts honeycomb, metal-foil structures and thin-wall tubing. A low-voltage sustained arc, quenched by a flood of water, yields cutting rates from 5-200 sq in. per minute.



"Moto-Mower is Made of Only the Finest Materials ...That's Why We Use Quality Steel"

REUBEN SMITH, Inspector, MOTO-MOWER, Inc.
Subsidiary of DURA Corporation

"Here at Moto-Mower quality is not just a word... it's the goal," says Reuben Smith, Moto-Mower inspector. "To achieve this goal we have to be sure every component meets our rigid standards. I've found we can really depend on the quality cutting blade steels we get from the *Sharon Steel Corporation, Sharon, Pa.*"

SHARONSTEEL **SHARON** *Quality* **STEEL**

Business Trends: A Return To Normalcy

For the foreseeable future, buyers will play the fiddle. Sellers will dance to their tunes. We have seen periods like this before. But this one will last for a while.

The next decade belongs to the salesmen. The idea-generators, the savvy research leaders, and human reaction interpreters will be their helpers. Top leaders who exploit "new" ideas—while they retain trusted "old" ideas—will crack the whip.

Production chiefs did so well that capacity, availability, and variety are commonplace. Now they have a new job. They must reduce costs—further.

Postwar shortage periods are through—for some time. Pent-up demand is gone. Products are sold on the basis of need, quality, cost reduction, and modernity. That's only part of the story. The other fellow has equally as good products. He lies awake nights trying to best his competitor. And so it goes.

This may be a prosaic life for those who have lived on a crash, crisis, and boom basis at breakfast, lunch, and dinner every day in the year.

We will continue to grow. But we will have pressure on prices, a new accent on quality, and a demand for personal attention. Those who don't heed this warning will sink rather than swim.

Our current business correction may be our introduction to a return to normalcy. It is not too painful except in steel. But the pain there is the direct result of the last gasps of the boom-dip-boom-dip type of steel buying. That was caused by three-year wage contracts and the tendency to raise prices each time a wage increase went into effect.

Things may change in steel following the last hurrah to come in 1962. Then it will be clear even to the union that things have returned to normal: A normal that says that regardless of who is in the White House there comes a time when the basic trend turns—as it always has in history.

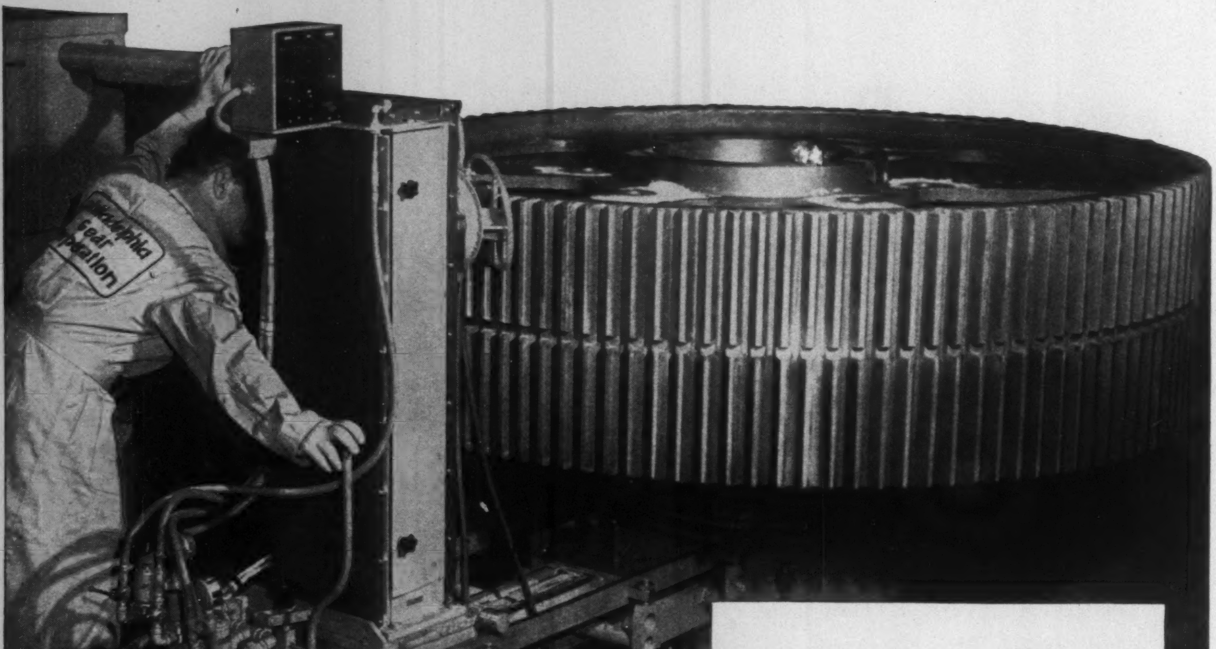
A return to normalcy does not mean a return to the dark ages. But it does mean fancy footwork is needed by unions and management. Just as you can't talk yourself in or out of a recession, so you can't talk yourself in or out of overdue long-term corrections.

A new phase is due—one where past excesses must be balanced out. If it doesn't come, it will make little difference what we think. We will have lost the battle to survive.

Tom Campbell

Editor-in-Chief

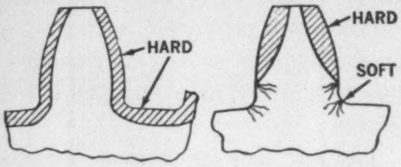
New Philadelphia induction hardening increases life of large gear drives . . .



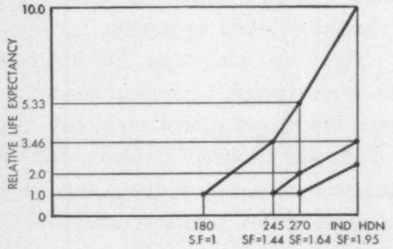
HERE'S WHY: Full tooth contour induction hardening of large gears provides a uniformly hardened surface from one tooth flank around the root and up the other flank without interruption. Eliminates points of thermal stress concentration. And there is no distortion, a problem of heat treated gearing that requires subsequent grinding.

This new, advanced Philadelphia method permits radical reduction in sizing and/or increased load carrying capacities. And it can easily harden even the largest spur, helical and herringbone gearing up to 180 inches in diameter, 20 inches in face, and 3/4DP.

Learn more about this new method for increasing the service life of your gear drives. Write for your copy of Bulletin 100.



New Philadelphia full contour induction hardening (left) provides a continuous hardened area from one tooth flank around the root and up the other flank without interruption. There are no points of stress. Typical heat treated gear (right) shows inadequate hardening of root of tooth, a point of major stress.



This chart shows the relationship between load and gear life. Note that the improved service factor of a gear set may be used to substantially increase gear life, rather than to increase the load.

phillie gear®

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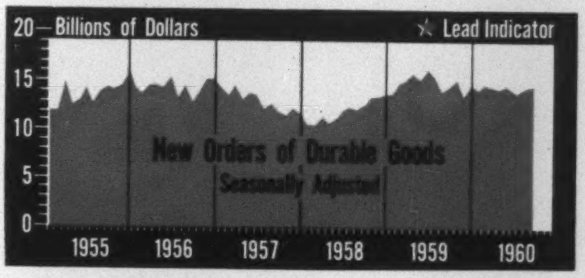
King of Prussia (Suburban Philadelphia), Pennsylvania

Orders Up, But Sales Down

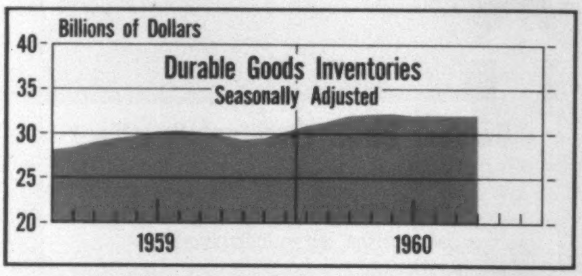
At a time when overall business outlook is dim, one of the most important indicators takes what may be a significant upturn. Orders for durable goods in September climbed to $14.68 billion, up from $14.4 billion in August, seasonally adjusted. This is the level of last March.



But at the same time, sales of durable goods (shipments) declined to $14.35 billion. This is the lowest point since the 1959 steel strike. The point for the optimistic view is that the rate of new orders historically leads sales in an upturn, and declines faster in a downturn.

Inventories Cling to High Level

In spite of strict inventory controls that have been applied for months in industry, inventory levels cling stubbornly to high levels. Manufacturing inventories in durable goods industries in September stayed close to the level of the previous five months. However, they did edge slightly below the $32 billion figure to $31.95 billion, seasonally adjusted. Analysts believe that primary metal stocks are low, but this is not necessarily indicated in the Dept. of Commerce studies.



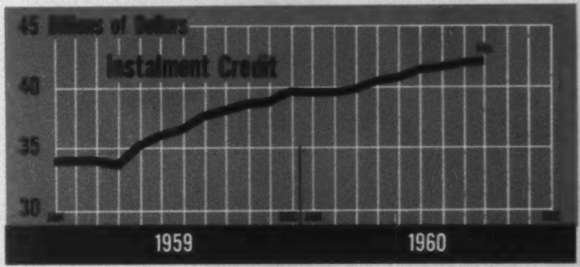
Military Retooling Possible

Will obsolescence of military production equipment mean a new replacement program? Inside the Pentagon, there is great concern over what many believe is a weakening of the U. S.'s industrial strength. It's argued that some 61 pct of production equipment is now obsolete and mobilization planners are alarmed.

Modernization of the nation's production potential would lead to the disposal of old production tools and replacement with more advanced, flexible equipment with shorter tooling cycles.

Consumers Extend Instalment Credit

If instalment credit is a measure of consumer confidence, there is a little, but not a great deal, of improvement. True, the September increase to $42,136 billion reflected some greater willingness to make purchases of consumer durables, where instalment credit is usually applied. But the improvement is well below the $500 million-plus gains reflected earlier this year and in the fall of 1959. Evaluated, it probably is a standoff, whether a mild gain or a continuation of cautious spending.



Steel: Wait Till Next Year

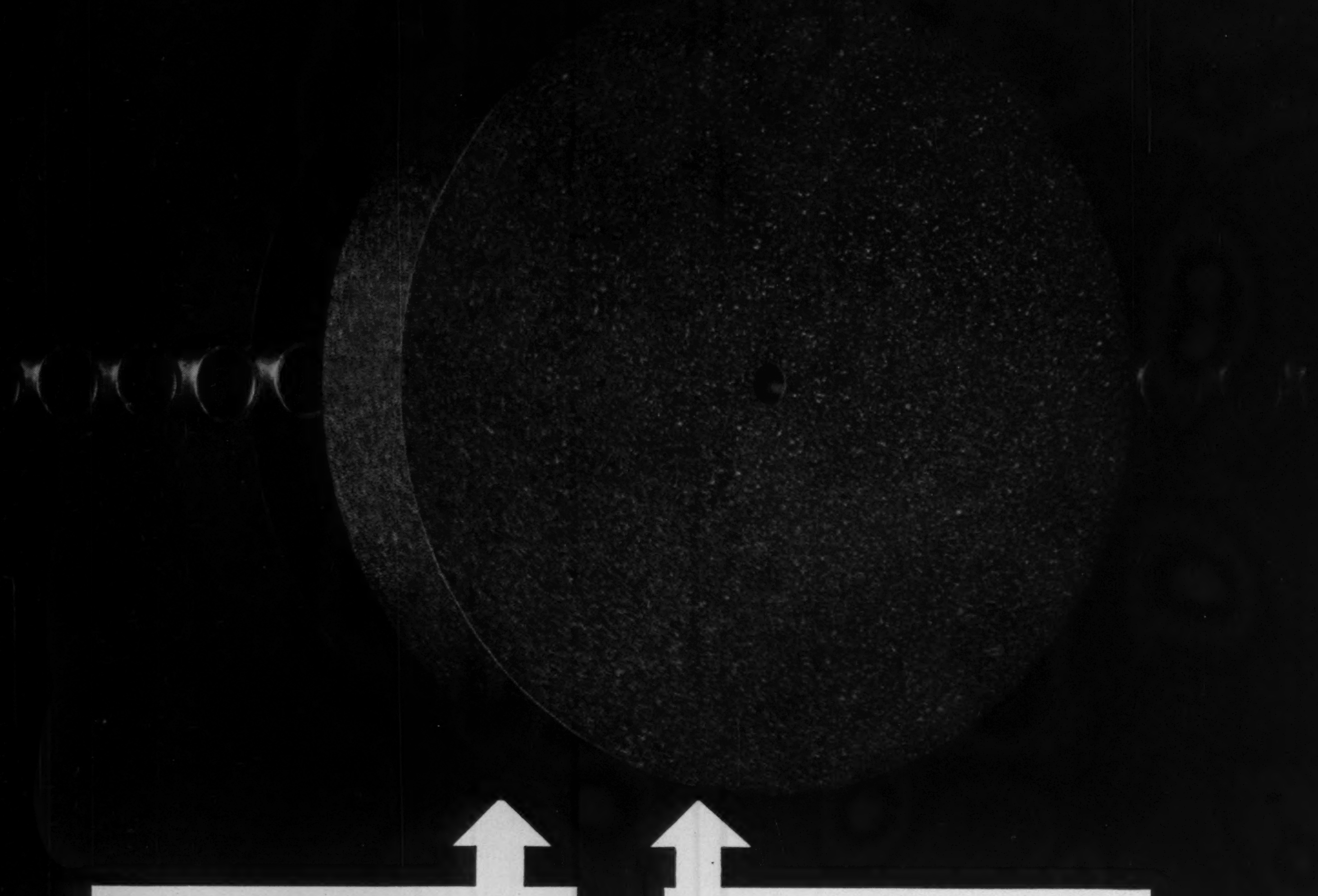
Just because the worst may be over for steel, that doesn't guarantee a sudden, sharp recovery. While steel users may have their inventories at rock-bottom, many of them have had to cut back their own production—and steel consumption. The pessimistic view: It's possible that there will be little change in the steel production rate until late next year. The mild view: Some significant change by March.

Is Europe's Economy Slipping?

Business abroad may be at the turning point. Key is the weakening of auto production in England, France, and Germany. (See International, p. 13) The decline of export of cars to the U. S. is a factor, but not the only one. The question is whether the downturn there is of a temporary nature or the beginning of a serious correction. Remember, there was no European recession in 1958. If one comes now, it could compound business troubles here.

Gardner solves problem of grinding unequal areas with two disc specifications

discs with different bonds and structure permit high production grinding to desired tolerances



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Gardner BKGR disc specification

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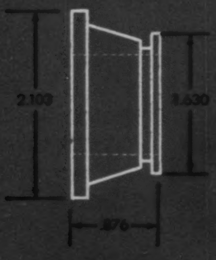

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abrasive discs

BELOIT, WISCONSIN

Teamsters: Hoffa Tries To Duck Monitors

Teamster president James R. Hoffa is making an all-out effort to unblock bars to a union convention.

HOFFA: Making a comeback?

If successful, it would open the way to complete elimination of monitorship of the International Brotherhood of Teamsters, Warehousemen and Helpers of America. It would also mean the return of Mr. Hoffa to complete control of the giant transportation union.

In one maneuver, Terence F. McShane, former FBI agent, has been barred from office as chairman of the Teamster Board of Monitors as a result of a decision by the Court of Appeals for the District of Columbia.

The ruling says Mr. McShane's appointment was not proper since he was not jointly nominated to the chairmanship by the parties to the consent decree which created the Monitor Board.

Defeat of the chairman means the Monitor Board is now non-operational. The consent decree requires majority action by the board. One member, Lawrence T. Smith, represents dissident Teamsters who brought about formation of the board. The other, William E. Bufalino, is a close friend of Mr. Hoffa.

In another action in the same court Teamster Hoffa has petitioned to prevent Federal District Court Judge F. Dickinson Letts from allegedly barring the scheduling of a Teamster convention and election. Judge Letts supervises the court-appointed monitorship of the union.

UAW: Out at Sikorsky

United Auto Workers has been voted out as bargaining agent for 5000 production workers at Sikorsky Div. plants of United Aircraft Corp. at Bridgeport and Stratford, Conn. The union lost the NLRB certification vote by 2557 to 2192.

A new union, the Independent Aircraft Guild, claims 1000 members, expects to have 2500 by December, and hopes to replace the UAW as bargaining agent.

The insurgent group was formed because its organizers believed the UAW had mishandled labor relations and forced an unpopular strike from June 7 to Sept. 4. The company's contract with its workers ran out last February 15.

Air Force Gets Tough

Air Force is reportedly adopting a tougher policy toward contractors to prevent jurisdictional disputes from causing further work stoppages on missile base construction projects.

It will require contractors subject to the National Joint Board for Settlement of Jurisdictional Disputes to comply with Joint Board procedures and decisions. Failure to do so will cost them their contracts.

USWA: The Big Spenders

Labor unions invested heavily in the election with campaign contributions. And, as of Oct. 25, the United Steelworkers of America, through its Voluntary Political Action Fund, was the biggest of the big spenders.

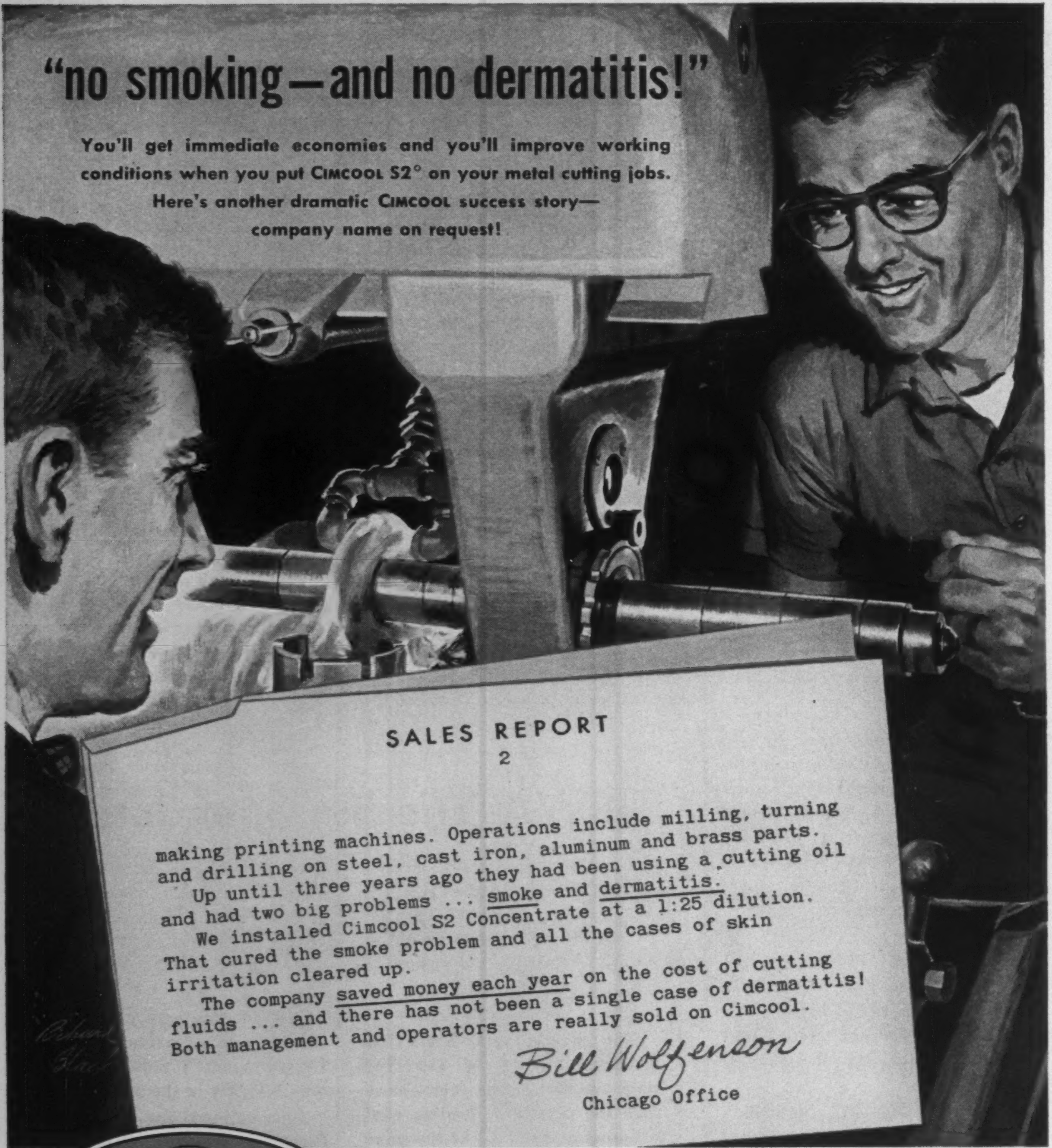
The Steelworkers' Fund has disbursed a total of $192,592 since the first of the year—more than the next three leading contributors combined. At the same time, the Fund collected only $123,002. However, it apparently expected no difficulty in raising the difference.

United Auto Workers' Committee on Political Education was surprisingly conservative. During the period it collected $70,228, but spent only $40,902. The funds were raised through voluntary rank-and-file contributions. However, the Committee for Good Government, financed by contributions from full-time UAW employees, took in $53,889 and spent $73,995 up to Oct. 24.

International Assn. of Machinists' Non-Partisan Political League spent $76,098, took in only $65,009 in the period.

International Brotherhood of Electrical Workers' COPE also operated in the red up to the October accounting period, spending $43,619 while collecting $38,191.

As expected, most of the funds went to Democratic campaigns. A few exceptions: The Machinists' League gave $925 to the Kennedy for President Committee and $5 to the Nixon for President Committee.



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SALES REPORT
2

making printing machines. Operations include milling, turning and drilling on steel, cast iron, aluminum and brass parts.

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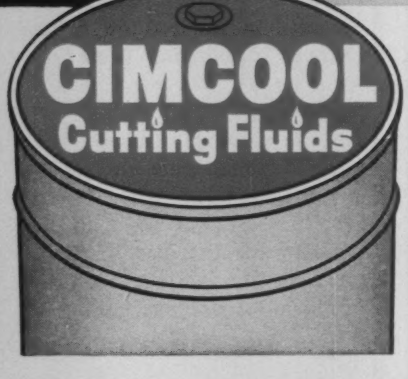
The company saved money each year on the cost of cutting fluids ... and there has not been a single case of dermatitis! Both management and operators are really sold on Cimcool.

Bill Wolfenson
Chicago Office



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By R. W. Crosby

★ Kefauver Awaits Price Move

Sen. Estes Kefauver is preparing to aim his investigative gun at the steel industry again.

The gun was cocked when the senator's antitrust and monopoly subcommittee read that Bethlehem Steel would survey market conditions on Dec. 1 to decide what to do about prices.

Committee investigators right now are preparing to analyze "any significant price adjustment." They are ready at any time to pull the hearings trigger.

Ever since the recent steel strike settlement, Sen. Kefauver has warned that he will "hold further hearings on any possible price advance which may occur" as a result of the settlement.

Subcommittee investigators say the senator has not changed his view that the committee "must continue to observe and study the administration of prices" in the steel industry.

And Democratic feeling, brought out by the election campaign, bolsters Sen. Kefauver's approach.

KEFAUVER: He's ready.

Many Democrats, to bend to the party needs, espoused a policy of restraining the so-called "administered price" industries.

It all bodes no good for steel men. To trod the Tennessee Democrat's investigation path again would probably have the same results as last time. There will be no outward physical damage, but plenty of inward aches and pains.

■ B70 Program Back in Action

As predicted, the Defense Dept. will now spend money voted by the Congress for a substantial speed-up in the controversial B70 super-bomber program.

Thus the Pentagon continues to reverse its earlier decision to freeze the extra half-billion dollars voted for defense spending by the Democratic Congress.

The $155 million in extra B70 funds made available to the Air Force by the Pentagon cuts down to $233 million what is left of the extra half-billion.

New prediction: The half-billion will fade into complete spending shortly. Next reversal: Probably extra funds for Army modernization.

■ Highway Program In the Red

Highway construction costs, including those for steel and concrete, continue to remain below last year's level. But the amount is so small it will not help solve financial troubles the nation's road building program faces.

Highway costs are about 0.5 pct below last year. Steel costs for road building are down about 4 pct.

However, this drop, even if it persists, will not stem the attack expected next year as Congress battles over how best to get the Federal program out of the red. As things stand now, the program is likely to run some $14 billion in the red by the scheduled 1972 completion date.

■ Higher Minimum Wage Bill Returns

Business interests in Washington are starting to battle new Federal controls over wages even before Congress returns to discuss them.

Industry and merchant representatives know both extension of Federal control over wages and a higher minimum wage rate will be brought up in 1961. Both came very close to enactment in this year's session.

They know, also, that they are fighting an uphill battle. Both proposals are likely to be enacted into law next year.

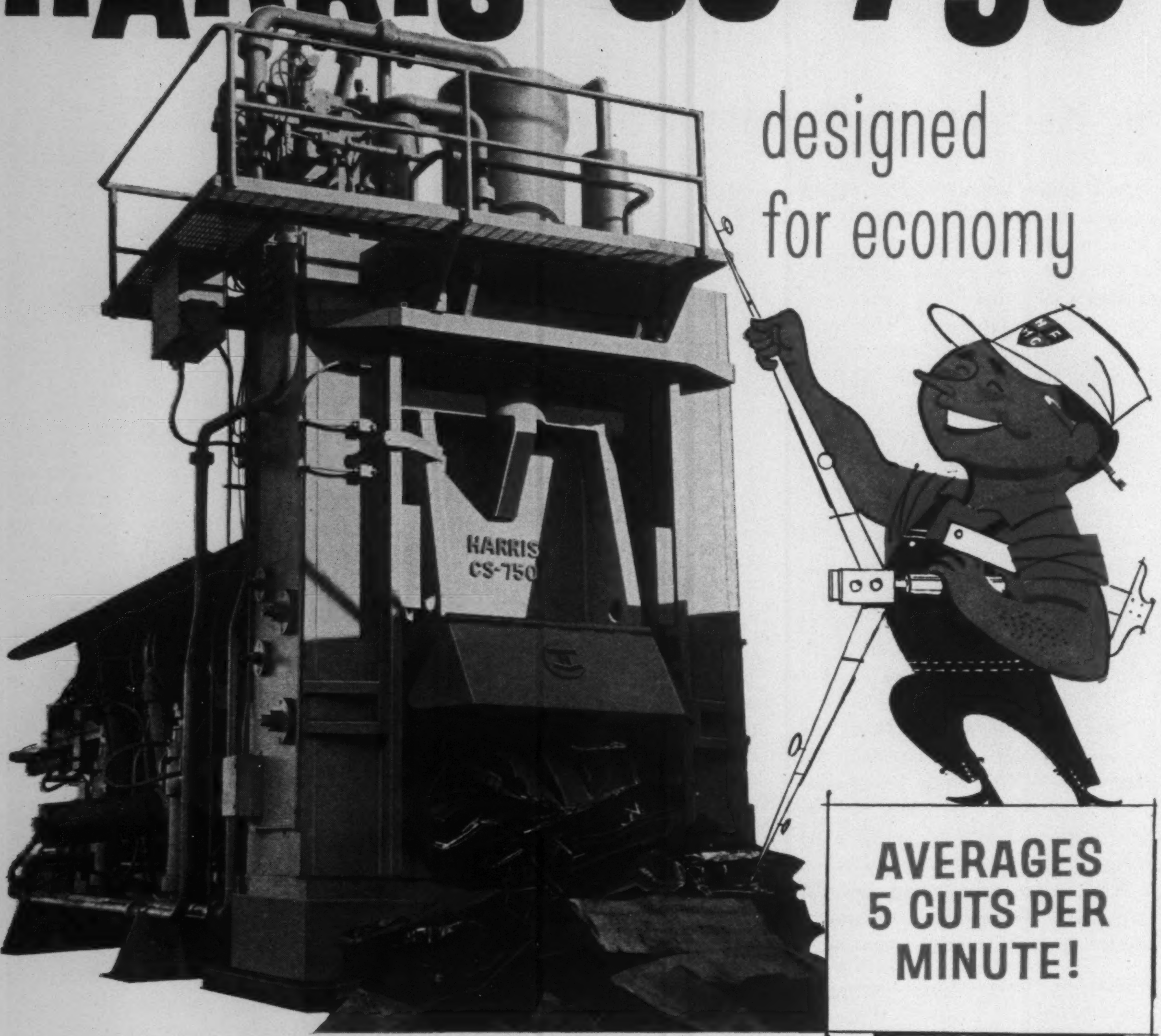
■ Senate Help For Small Business

Legislative efforts to channel more defense business to small companies are in preparation.

Sen. William Proxmire, (D.-Wis.) says he will introduce such legislation in January. His bill will permit the Small Business Administration to find out what items are needed by prime defense contractors and make the information available to small firms. It will also call for information to prime contractors on what small firms can handle their defense subcontracting.

Sen. Proxmire hopes to undercut Pentagon policy of giving contract plums to big companies. Military men insist that small firms are not capable of handling precision missile work and weapon systems.

HARRIS CS-750



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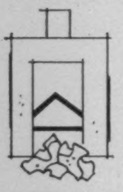
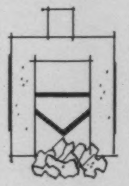
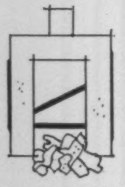


Inverted Vee Head
Flat Bed



Horizontal Head
Vee Bed



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Allied-Russian Trade Attitude Defined

Differences in the attitude of the U. S. and Western European allies toward trade with the Soviet bloc countries were underlined by F. D. Hockersmith, director of the Commerce Dept.'s export policy staff before the National Machine Tool Builders Assn. last week.

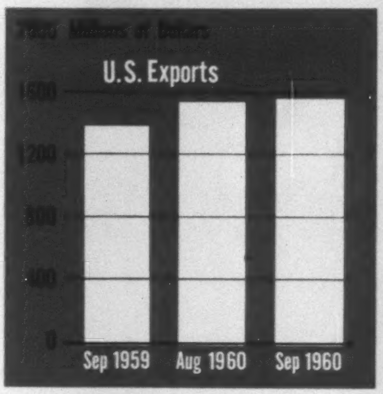
During the four years from 1956 to 1960, Western European exports of metalworking machinery to Russian and European Soviet bloc countries increased eight times. This came to $29 million in 1959, of which $7.8 million went to the USSR. This was a substantial factor in the increase in the overall trade of these countries.

This trade is expected to continue, says Mr. Hockersmith, because of the heavy dependence of Western European countries on international trade. The need to provide markets for their products makes Western European countries more inclined to look to the long-range rather than to immediate benefits.

They are not so apt to let day-to-day political differences exert as strong an influence on their long-range economic plans. They feel that the benefits which accrue to the Soviet nations by this trade are outweighed by the benefits accruing to themselves.

They also feel that close proximity to Soviet states puts them within easy reach of missile bases and that little or no strategic benefit results from trade restrictions.

Finally, most European countries feel this trade contributes to a lessening of tensions between the East and the West and the chances of an actual conflict are thereby lessened.



Export Decline Ends

The four-month decline in exports was brought to an end in September when outgoing goods totaled $1.57 billion in value.

This represents an increase of two pct over the $1.55 billion shipped in August, and a 13 pct increase over September, 1959, according to the Dept. of Commerce.

The upswing allowed Government, private and international economists a breath of relief following the continuing decline between April's $1.708 billion export total and August totals.

Interest Keeps Growing In Foreign Steel Sites

The interest in foreign sites as possible production centers for steel is growing. In a steady parade, U. S. steelmen are checking spots in India, North Africa, Turkey and most of Europe for likely areas for production.

Projects being considered include tinplate and pipe for North Africa, electric furnace capacity for India. The call of foreign markets is particularly strong today because producers find domestic growth limited by ample capacity and by antitrust bars to vertical integration.

British Won't Raise Steel Prices

The increase in cost of coal to British steelmakers by the nationalized mining industry will not mean a steel price increase this year.

Steelmakers say the extra burden of $36 million brought on big the increased coal costs will not be passed on to consumers. But consumers cannot look for a drop in steel prices, either.

There have been three price cuts in the last two and a half years which have lowered the cost of steel about 3 pct. It was thought that a price drop might come because of savings steelmakers are getting from a high production rate and lower cost imported ore. But this thinking is ruled out for this year.

British Auto Output Drops Heavily

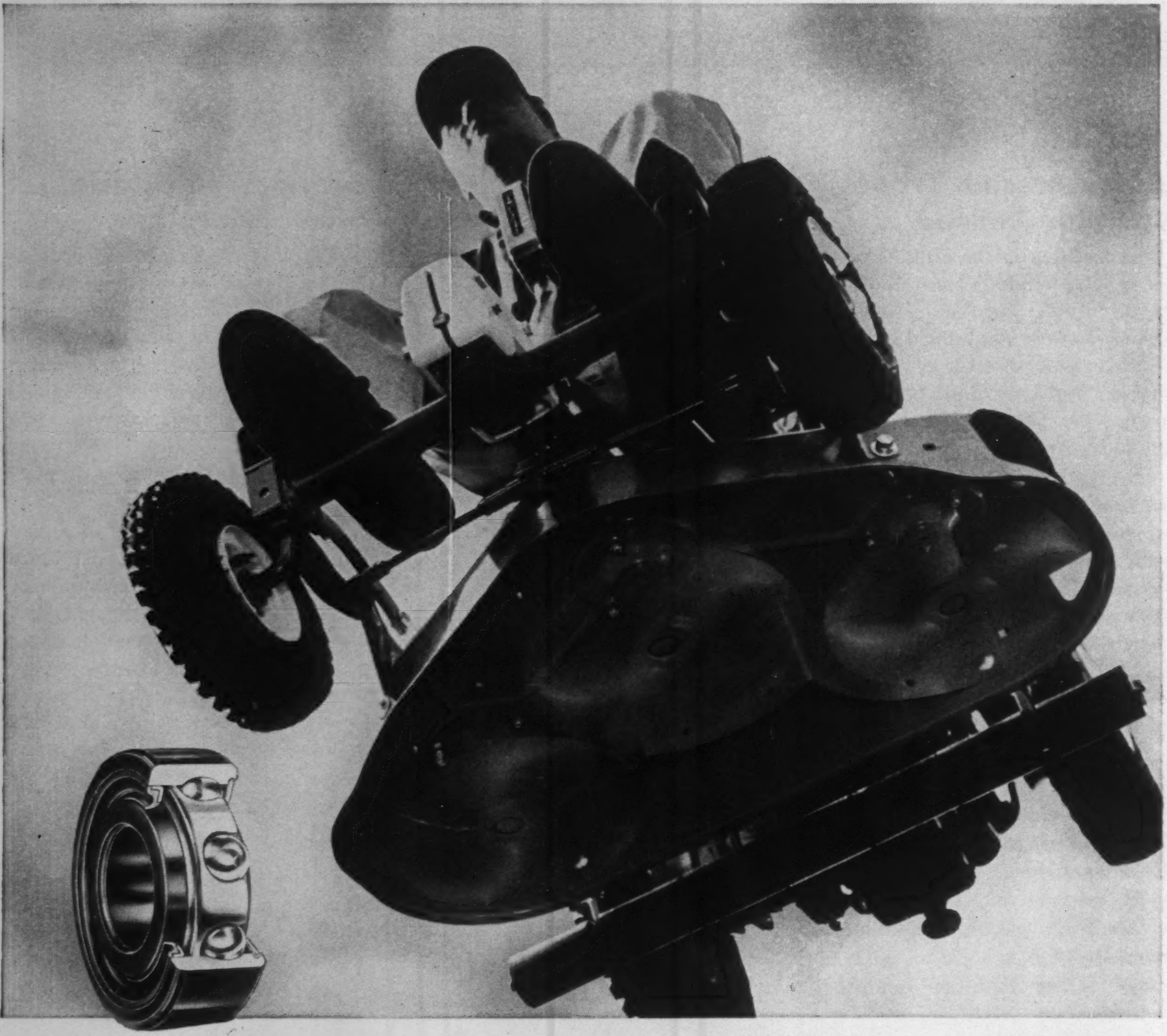
British automakers are suffering from compounded compactness. Exports of British passenger cars fell off sharply in September and reached their lowest level since February, 1957.

The fall resulted almost entirely from lower shipments to North America. And with the new compacts out this year coupled with those introduced last year, the picture for the British is all but bright.

To counter the decline somewhat, the British Government has reduced the bank rate from 6 pct to 5½ pct. This makes it easier to borrow money to buy cars and other goods. But the Government has refused to ease credit restrictions generally. Britons look for no upturn in car sales until spring.

In contrast, Italy's motor vehicle production during the first nine months of 1960 showed an increase of 39 pct over the same period in 1959.

NEW DEPARTURE CASE HISTORY

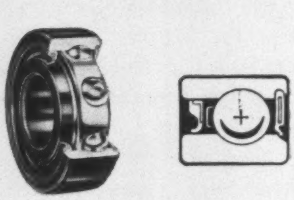


HOW N/D BALL BEARINGS REDUCE MOWER MAINTENANCE AND PRODUCTION COSTS!

PROBLEM: Manufacturer of well-known power lawn mower wanted to make unit more maintenance-free.

SOLUTION: Complete re-evaluation of all rotating parts including a study of rotary blade bearings by N/D Sales Engineer. His recommendation: Replace six existing non-integrally sealed bearings with lubricated-for-life New Departure ball bearings. These factory greased bearings are equipped with integral Sentri-Seals* and Land-Riding Seals. Results: Greater consumer sales appeal by doing away with the need for relubrication maintenance. In addition, N/D's compact ball bearings reduce production cost by eliminating separate bearing seals and six unnecessary grease fittings.

If you're designing new products involving bearings, invite a N/D Sales Engineer to your next design discussion. His knowledge of bearing engineering may result in a savings and valuable new product sales features. Contact him at your local N/D Sales Engineering Office, or call or write New Departure, Division of General Motors Corporation, Bristol, Connecticut. *New Departure Registered Trade Name.



Integrally sealed N/D ball bearings eliminate need for relubrication, grease fittings and separate seals. These heavy-duty N/D bearings with Sentri-Seals* and Land-Riding Seals, shut out moist or dry contaminants.

NEW DEPARTURE

BALL BEARINGS · PROVED RELIABILITY YOU CAN BUILD AROUND

Explosive-Forming Gas

An electrolytic gas cell, which generates an oxygen-hydrogen mixture, shows promise as a fuel source for explosive metal-forming operations and high-temperature welding and cutting torches. The generator consists of flat nickel-plated steel electrodes. These electrodes are placed 0.06 in. apart in a plastic container holding caustic solution. Trace elements of caustic in the gas mixture create a yellow flame, making the gas visible and thus a lot easier to control.

Measure Breakaway Force

New spring-tension gages measure the force needed to free an object that's held by a spring member, inertia or friction. Auto maintenance men find these gages useful. They help to check the springs on distributor-breaker arms, generators and starter-brush holders.

System Boosts Work Load

In most hydraulic-equipment catalogues, it's hard to find equipment that's rated up to 10,000 psi. Nevertheless, cylinder makers report they are frequently asked for parts rated at 20,000-40,000 psi. One manufacturer is currently working on a booster system that promises to handle hydraulic pressures in the 60,000-psi range.

Uses Convection Currents

A new concept in salt-bath heating centers on the effective use of convection currents. Heating takes place as an electric current passes through pairs of oppositely sloping passages or tunnels. These tunnels separate the main portion of the bath from small wells where immersed electrodes introduce the electric current.

Higher Fatigue Strengths

Greatly increased fatigue strengths of steel, magnesium and copper-beryllium alloys result from coatings with one-molecule thick layers of certain organic-chemical compounds. These coatings consist of molecules which have at least seven carbon atoms in a chain with a "polar group" at one end. These molecules tend to pack together. The polar groups attach themselves to the base metal.

Automatic Chip Breakers

Actuated by outgoing chips, universal chip breakers, used in the Soviet Union, set themselves to adjust for any changes in lathe-cutting conditions. Each chip breaker is in the form of a lever and spring assembly. An eccentric cam positions the lever at 0.019-0.039 in. from the cutting edge. The spring automatically compresses until its force balances the chip's pressure. When these forces become equal, the chip breaks.

Sinter Parts at 5100°F

Designed for melting or sintering work at continuous heats up to 4800°F, a new resistance furnace can be used intermittently up to 5100°F. A flow of helium insures atmospheric control in the working chamber. Recommended flow is 5 cu ft per hour. Furnace electrodes, cover plates and shell are all cooled by a flood of water.

Line Speeds Zinc Plating

Recently installed, a new zinc-plating line handles over 100 different part sizes automatically. This plating line forms part of a plant's monorail trolley. Work never leaves the trolley. There are 31 stations on the line. Production rate equals 240 racks or 120 trolleys per hour.

Nylon Reduces Vibrations

Nylon drill adapters are said to accurately hold drills with broken or scarred shanks. They also prevent scoring when used with new drills. These adapters reduce the vibrations that are transmitted to a drill's cutting edge by 25 pct.

Desulphurize With Lime

The contact surface between lime and molten iron has "remarkable" effects on the rate of desulphurization. This is the report of The Iron and Steel Institute of Japan. To obtain effective desulphurization, the lime should be finely pulverized. A large contact area, relative to the pig iron's mass, speeds the desulphurization rate.

INTERNATIONAL SILVER ANNEALS 35,000 LBS. OF BRASS & CUPRO-NICKEL A DAY

in these Power Convection bases

One man is now as productive as many 2-or-3 man annealing departments, and the tools that make him so valuable are these Surface Power Convection* annealing bases. Along with his production rate of 35,000 lbs. a day, he gets exceptional quality in his finished brass and cupro-nickel coils. Power Convection equipment never lets the temperature vary more than 10°F from top to bottom of a load. While one load is heating or soaking, a second is cooling, and the operator prepares the third load on its tray. A single crane handles all loading and unloading.

All the operator does to start a heating cycle is make a single electrical connection between cover and base. The International Silver Company, Meriden, Connecticut, is one of many manufacturers who are realizing higher earnings from Surface Power Convection equipment. You can be another, simply by calling Surface Combustion, 2373 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces Ltd., Toronto, Ont.

*Trademark of Surface Combustion, Division of Midland-Ross Corp.

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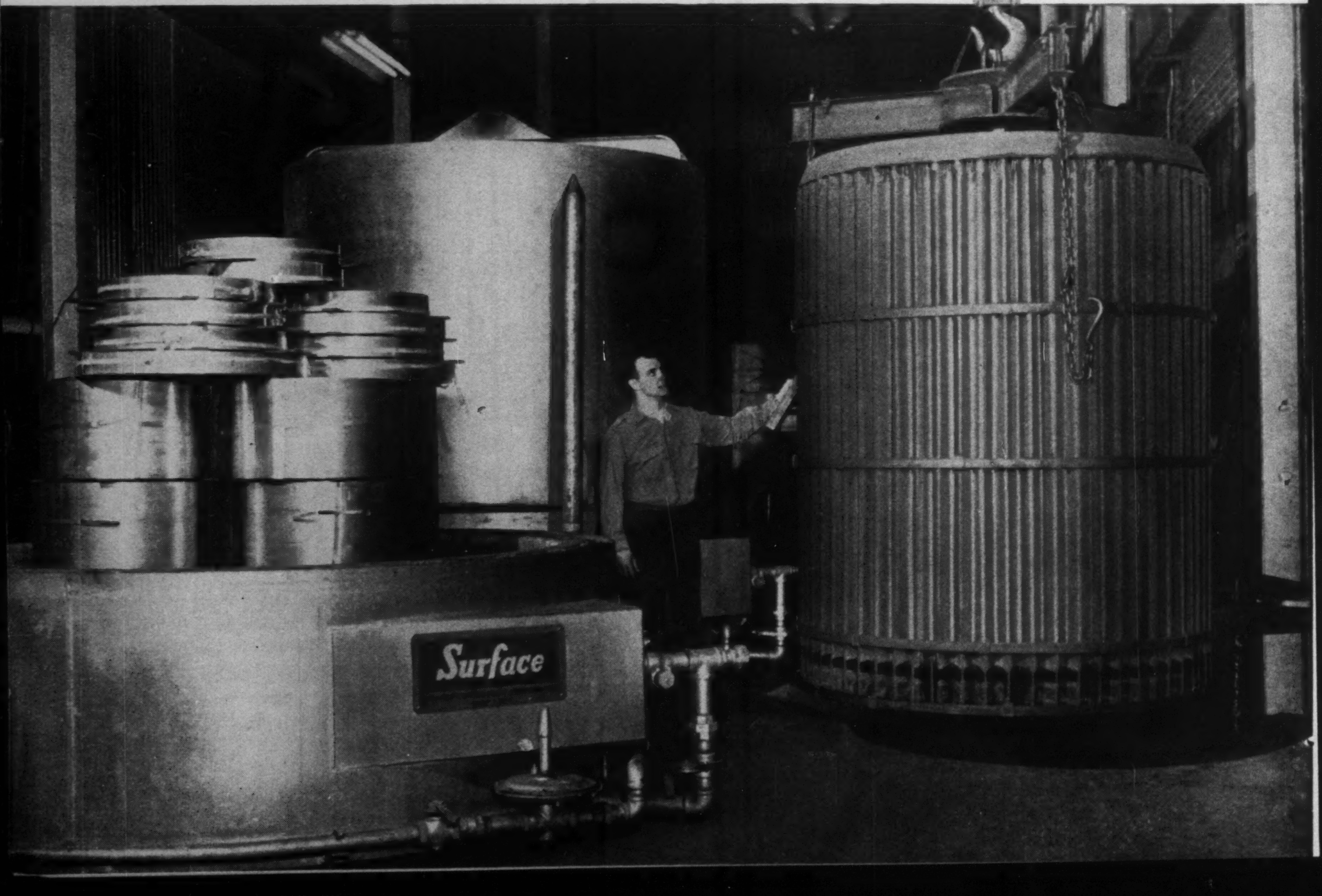
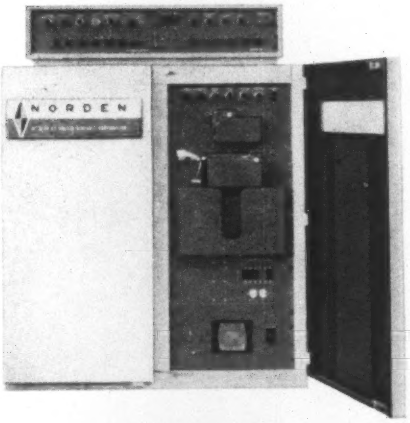


NORDEN

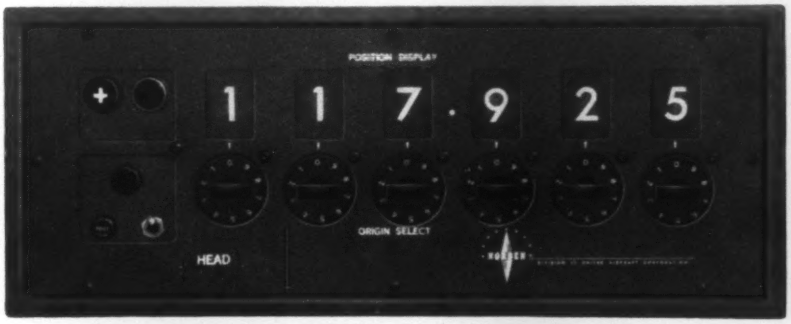
Modumatic control systems for automatic positioning

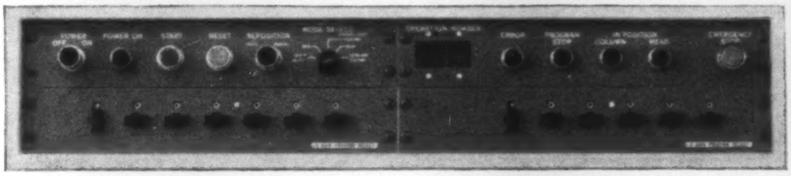


The Norden Series 600 is a numerical control system for automatic point-to-point linear or rotary positioning.

This system features a new concept in numerical control with modumatic design permitting the exact degree of automation required.

This new concept is achieved by an exclusive design utilizing an absolute digital feedback transducer, electronic circuitry, and visual display. It offers complete automatic positioning with input from either manual dial-in or punched tape. Display units provide continuous decimal readout of *actual* position—not command.





NORDEN 600 SERIES FEATURES:

Full Range Electronic Origin Select—allows desired offset to be quickly and easily dialed in by the operator on manual selector switches.

Actual Position Readout—the actual position is displayed in straight decimal form by illuminated numbers that are readable from twenty feet.

Full Range Electronic Positioning Select—allows positioning to be controlled manually or by tape. Tape program can be interrupted to insert additional or intermediate operations.

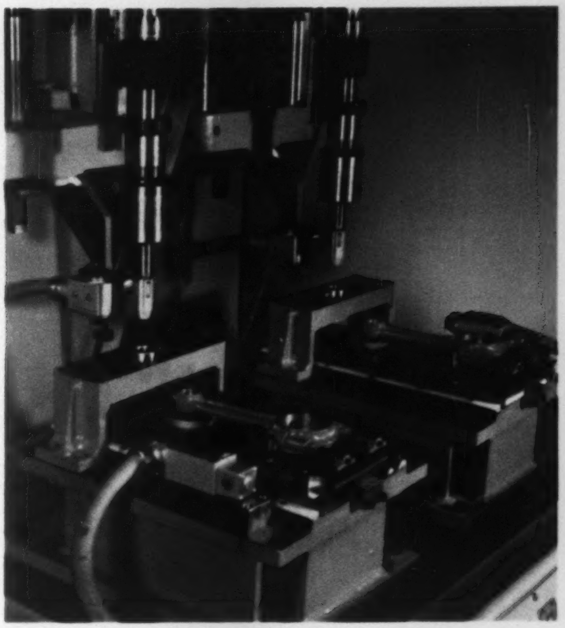
Controlled Programming—with automatic tape punch equipment, tapes may be prepared "on the machine" providing a permanent inspection record or a programmed tape for playback applications.

For complete details on the Series 600, or other modumatic control systems, contact your nearest Norden Representative—400 Main Street, East Hartford, Connecticut, JAckson 8-8411—11 West Ave., Dayton 2, Ohio, BAldwin 8-4481, or write to us at the address below.

NORDEN DIVISION OF UNITED AIRCRAFT CORPORATION
DATA SYSTEMS DEPARTMENT
3501 HARBOR BOULEVARD, COSTA MESA, CALIFORNIA

NATCO
NATCO

Short-bore production honing finally gets its own machine tools—sturdy Natco/Jes-Cal mechanical honing machines built to maintain honing tolerances under continuous production conditions.



NEW

Natco Heavy Duty Production Honing Machines

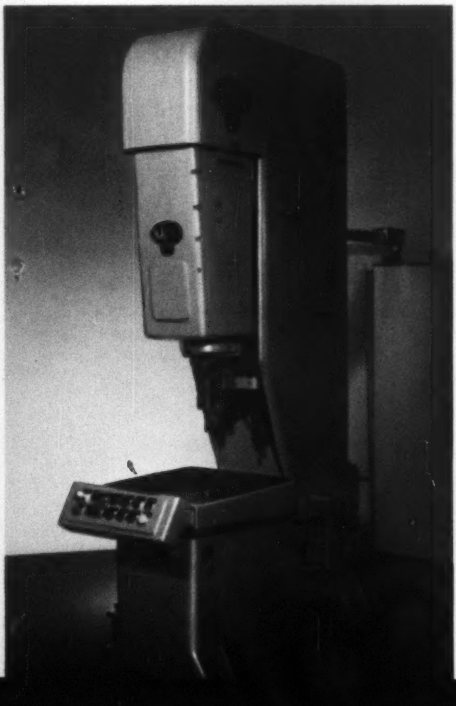
Pinion gears, connecting rods, rocker arms, compressor components—Natco/Jes-Cal mechanical honing machines have been developed for better honing of just such parts as these.

These new machines are designed to use production-proven Jes-Cal honing tools with the exclusive, automatic, plug-gage method of size control. Add the sturdiness and tolerance-holding stability of Natco machine design and you know why these are machines to end your production honing problems.

They will hone any bore from ½″ to 3″ in length and up to 3″ in diameter. Rotational speeds of 200 to 800 rpm and reciprocation from 60 to 240 strokes per minute are fixed by pick-off gears. Stroke length up to 3″ is adjustable in desired increments.

Use them singly or as multiple heads on a common base. Integrate them into your transfer line—they are fully compatible with Natco drilling, tapping, boring, and milling machines. For more facts call your Natco or Jes-Cal representative. Write for Bulletin 200.

The National Automatic Tool Company, Inc., Richmond, Indiana NATCO



Natco/Jes-Cal mechanical honing machines can be set up singly or in batteries on a common base. They are easily integrated into a Natco fully automatic transfer line.

Is your honing problem—or something like it—in this collection? These are typical jobs honed at high production rates on the new all-mechanical Natco/Jes-Cal honing machine.

Kennametal Carbide Engineer—Shop Foreman—Machine Operator

3-man team solves machining problem

. . . reduced tool breakage and chip hazard —increased production and cut tool cost 70%

PROBLEM: Excessive tool breakage due to scale, run-outs and erratic tool grinding; dangerous operating conditions due to poor chip control.

SOLUTION: After cooperative study of problem, 3-man team recommended a change to heavy duty Kennametal* throw-away insert tooling with solid Kennametal chipbreakers to eliminate grinding.

RESULT: Increased speed and feed 30%, tool cost reduced from $1.81 to 51 cents per piece, improved chip control, and eliminated all grinding.

That's the kind of product and service that you can get through your Kennametal carbide engineer.

Thoroughly trained in carbide products, he devotes his time exclusively to the sale and application of Kennametal hard carbides . . . and is well qualified to provide on-the-spot analysis and recommendations. If your job requires unusual or special design engineering and application service, your Kennametal man will make our headquarters engineering and manufacturing facilities available.

Depth of on-the-job experience—plus the continuing development of a variety of tungsten, titanium, and tantalum carbide grades—has lead to the use of Kennametal compositions in practically every industry. And our product development group, by working in close cooperation with design engineers, sales engineers, and customers, keeps coming up with new products and new applications—engineered and developed to meet both general and specific customer requirements.

Whether it be in metalworking, mining, or general industry, there is a quick and proven way to find what Kennametal products and services can do for you. Just form your own 3-man team—two selected from your organization plus your nearest Kennametal Carbide Engineer. You can phone him or write direct to KENNAMETAL INC., Dept. IA, Latrobe, Pennsylvania.

*Trademark 33554

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LETTERS FROM READERS

Disappointed

Sir—We were very much disappointed to find that we were not included in the tabulation on p. 114 of the Oct. 20 issue of The IRON AGE entitled, "Where Vacuum Melting Capacity is Located," especially since we were the first in our industry to enter this field. For your information, we have one vacuum furnace of the induction type yielding ingots of 300 lb or 700 lb per heat. Normally we melt electrical and magnetic alloys and process wire, ribbon and strip.—Theodore Packard, Driver-Harris Co., Harrison, N. J.

Complacency?

Sir—In reply to one of the letters from readers in the Oct. 27 issue of The IRON AGE, you commented that present steel production is about 93-94 pct of the 1947-49 capacity. You concluded by present figures that present production indicates "we are not doing badly." Personally, I do not consider it gratifying or desirable that American steel production has not increased or increased only nominally over the past 11-13 years. I am wary that complacency such as contained within your statement is a contributing factor to the declining rate of industrial expansion during the past few years.—Peter M. Lee, Philadelphia, Pa.

■ **Reader Lee is correct. Our statement—we must now admit—was changed from "We're not going to hell in a wheelbarrow" to keep it clean. But we should have let it ride. We're not complacent, but we're not panicking either.—Ed.**

X-Ray Check

Sir—Would it be possible for us to get technical information on the X-ray method for checking thickness of electroplating such as was described in your Sept. 29 issue on p. 15?—Leo A. Donovan, president, L. A. Donovan Co., Inc., Woburn, Mass.

Sir—On p. 15 of the Sept. 29 issue we read a paragraph entitled, "X-rays Check Plating," and found it very interesting as it appears to be a nondestructive method. We would appreciate it if you will please tell us where we could write for more specific information on this process. We enjoy reading The IRON AGE because we often learn of some very interesting new developments from the various feature items. — V. I. Wiegand, General Electric Co., Cincinnati, O.

■ **On p. 84 of the Oct. 13 issue we carried a more detailed article about this particular process. This might contain the information you are seeking. If not, contact R. H. Zimmerman, associate research engineer, AMP, Inc., Harrisburg, Pa.—Ed.**

Terrific

Sir—I do not ordinarily write letters to the editor, but I think the editorial in the issue of Sept. 29th ("Our Future Growth: How Fast and How Much?") was terrific. Keep it up.—Walter C. Chaffie, vice president, Bennett Pump Div., John Wood Co., Muskegon, Mich.

Reference

Sir—While gathering data for my graduate work at the University of Missouri, I came across some articles on problem employees which appeared in The IRON AGE in August 1959. If possible, could you send me some reprints of these articles for further reference. — George P. Huber, Columbia, Mo.

■ **Copies of the series of three articles by Robert N. McMurry, president, The McMurry Co., Chicago, are on the way.—Ed.**

TO MEET YOUR REQUIREMENTS

STANDARDIZE 100% ON Southern FASTENERS

Just name your fastener requirements. Chances are that the screw or bolt you need now is in Southern Screw's stock of 1,500,000,000 pieces—and in the exact size, head style, material and finish you want. If special plating is one of your requirements, Southern has its own plating department.

Perhaps price is a big factor. Remember; in the final analysis, the best cost less. Southern fasteners are the best you can buy.

See for yourself how USA-made Southern fasteners can meet your requirements. Get in touch with your nearest Southern Screw distributor, or write Southern Screw Company, P.O. Box 1360, Statesville, N. C.

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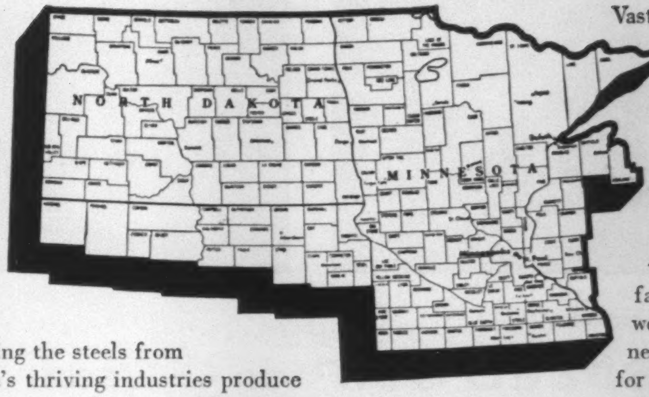
ONE OF A SERIES DEPICTING MARKET AREAS SERVED BY INLAND • ART BY NICKOLAS SIDJAKOV

INLAND STEEL IS HERE



Gateway to the great northwest, the Twin Cities form an enormous distribution center—shipping the products of its industries over thousands of square miles. And here, Inland serves— furnishing the steels from which Minnesota's thriving industries produce air conditioners, vacuum cleaners, refrigerators, cranes, derricks—bridges, railway cars, farm cultivators, bins, batteries of all-steel silos, structures for an expanding petrochemical industry—millions of cans for this fertile land's great food-packing industry—diverse products like corrugated metal culverts, electrical controls and equipment for Minnesota's famous millers.

Inland men, representatives of their company, make this land their home—love it for its lakes and forests—are proud of its heritage. Here, is the source of the Mississippi, Father of Waters. Here, is the famous Mayo Clinic. Here, are the Mesabi iron mines and the great ore shipping port of Duluth. This is the land of Paul Bunyan and of Sinclair Lewis and of the Minneapolis Symphony Orchestra. And from this land comes Scotch Tape, Univac, sugar beets, canning corn, peas, potatoes, wheat to feed the world and millions of Christmas trees to gladden the hearts of children all over America.

Vast is this territory, covering all of Minnesota, North Dakota and the northern half of South Dakota. A tremendous land, yet everywhere Inland is a familiar name—welcomed as a good neighbor, respected for the quality of its products, unstinting metallurgical counsel, its dependable service. Here, Inland has grown as the area's industries grew and expanded—sharing good times and bad—learning through intimate experience as the men who built the plants and made the products grew in stature and in technical knowledge.

Here, Inland has served for many decades—enjoying the confidence and friendship of northwest businessmen and civic leaders—and here Inland will continue to serve in all the years to come.

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Engineered by Tinnerman . . .

One-piece **SPEED CLIP**® on O-Cedar Sponge Mop replaces 3 parts, eliminates riveting

O-Cedar put the squeeze on high assembly costs when they redesigned their famous squeeze mop. The first money-saving step was to call in Tinnerman fastening experts.

The result was a one-piece spring steel SPEED CLIP which replaced three separate parts and eliminated a riveting operation. This new fastener locks itself in place on the squeeze plate, and holds it up and out of the way when snapped over an anchor tab provided on the mop base. Live spring action assures positive retention for full mop life.

Assembly is faster, better and substantially reduced in cost!

Savings and improvements like these can be made in your product with SPEED NUT Brand Fasteners. If you'd like to have a Tinnerman FASTENING ANALYSIS made to help you find such savings possibilities, call in your SPEED NUT representative. The service is free . . . you'll find him listed in the Yellow Pages and in SWEET'S PD File under "FASTENERS." Or write direct.

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FATIGUE CRACKS

Opinion Poll

The election is now past history, but the work for the new President is just starting. The cabinet posts must be filled, and new programs drawn up before Inauguration Day.

But the question most businessmen are still asking themselves is what will be the effect of the election on their business plans. And, like everyone else, we are wondering too.

The Answers — With that in mind, some time before election we decided to do our best to answer that question. Or, at least ask the best men we can find what they believe the answer to be.

Right now, we don't know. But all of our coast-to-coast news bureaus are working on the answer. Next week you will see the results in a Special Report on how business interprets the election results.

The Questions—Some questions: Can we expect more stability or less? Is inflation going to be a factor? What is the outlook for defense spending? What's the situation in Washington? What can you expect from Congress?

And, while we think of it, you can expect redoubled coverage of the political scene in the weeks and months ahead to keep you as best informed as possible of what to expect from the new Administration and what's going on in the period of transition.

Club Car Politics

A few days before the election, most of the candidates for high office were scurrying around the country in motorcades and chartered airplanes in last-minute efforts to win a few more votes.

About this time one of our editors, riding the train from Philadelphia to New York City, encountered one of the vice presidential candidates in the club car. There was no large entourage of advisers, press agents or political followers. No large mob was expected to meet the train at the station.

The Awakening—At first, club-car companions were unaware they had a vice presidential candidate in their midst. But, where a candidate is involved, this couldn't last for long. Partisan Republicans and Democrats popped up like mushrooms in a damp basement, seeking the candidate's views on everything from Castro and Cuba (for) to Khrushchev (against).

The answers were not at all like those to which the club-car companions were accustomed. But then again, neither was the candidate.

For one thing, the candidate was a woman—Mrs. Myra Weiss. For another, she was the candidate for the Socialist Workers Party.

Dedicated Housewife—She presents none of the characteristics of the stereotyped wild-eyed radical. She looks very much like the housewife she is. Mrs. Weiss is educated —Utah State, Univ. of California. And she is dedicated—to Socialism.

She—and her party—are pro-Castro and Cuba and the Congo. She is against war—hot or cold, and the weapons of war. But she is also against Communism (as are all true Socialists) —and, naturally, Capitalism.

Myra, as she preferred to be called in club-car informality, held her own against the businessmen, department store buyers, and assorted travelers as they displayed their loyalties as Democrats and Republicans.

(One of the few who showed no such partisanship: An Air Force captain, who listened to all with a faint trace of amusement showing on his face. Regardless of the winner, he was getting a new boss.)

In Good Taste—The Socialist Workers Party's candidate didn't win any votes between New York and Philadelphia. But she certainly enlivened a usually-routine trip.

STRAITS TIN REPORT

MALAYAN TIN BUREAU

News of developments in the production and uses of tin

Rubber tin—A tin compound that stretches like rubber and can be vulcanized has been developed by the Army. Tin is substituted for carbon, the usual base of rubber. The new polymer, alkyl tin methacrylate, is a "stretchable" high-temperature material with greater resistance to chemical fuel than conventional rubber. This may lead to a series of carbon-replacement materials similar to boron chemical fuels.

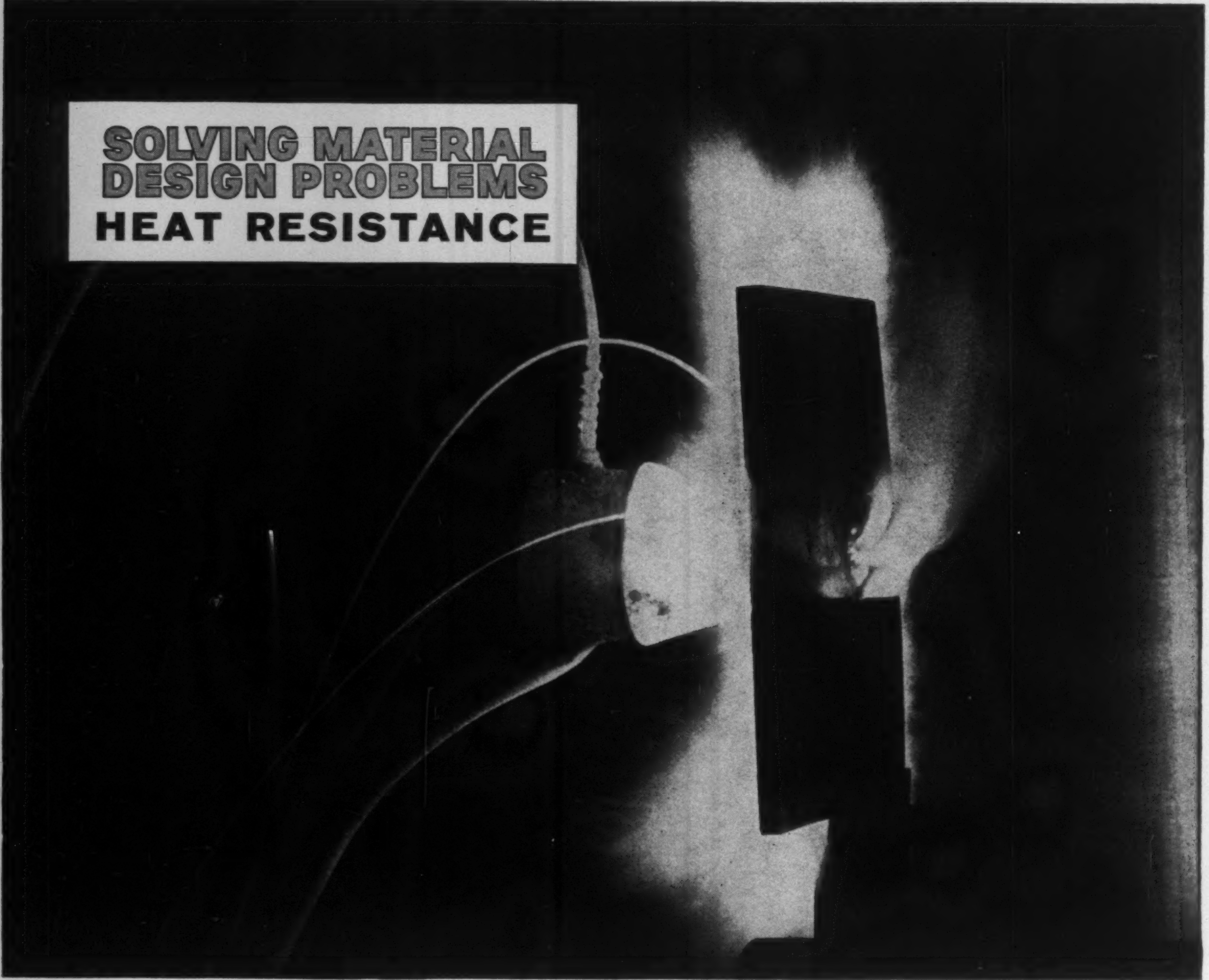
New tinplate that is lighter, stronger and thinner than any ever made is being researched by major steel producers. It shows great promise and is expected to offer important economic advantages to canners and other tin plate users, for shipping and product protection. No change in tin content of the new plate is indicated.

Nonspattering flux is the result of experiments by Tin Research Institute. The new soldering process uses polyethylene glycol instead of acidified water as a vehicle for acid fluxes. It has a low boiling point—flux won't spatter when it contacts molten solder or soldering bit. Spreads smoothly over large area. Won't rust or corrode; residue washes off easily. Low volatility prevents evaporation; high flashpoint eliminates fire risk. No unpleasant odors or harmful fumes.

Write today for more data on these items or for a free subscription to TIN NEWS—a monthly bulletin on tin supply, prices and new uses.

The Malayan Tin Bureau
Dept. 54-L, 2000 K Street, N.W., Washington 6, D.C.

SOLVING MATERIAL DESIGN PROBLEMS
HEAT RESISTANCE



A 5000° flame takes ten minutes to penetrate a one-quarter inch piece of CDF's new Dilecto RD-105 laminate. The same thickness of cold-rolled steel is pierced in less than forty seconds.

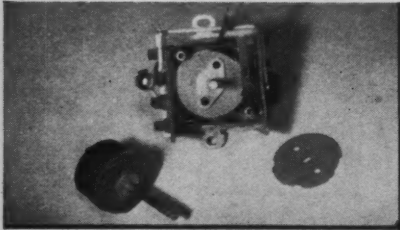
Molded from graphite fabric impregnated with a heat (ablation)-resistant phenolic resin, new CDF grades RD-105 and RD-115 are being evaluated in solid propellant rocket motors.

Dilecto laminates are only one family of products from industry's largest selection of non-metallic structural materials and electrical insulations. Vulcanized fibre, silicone rubber and mica, and thermosetting moldings are also supplied by CDF.

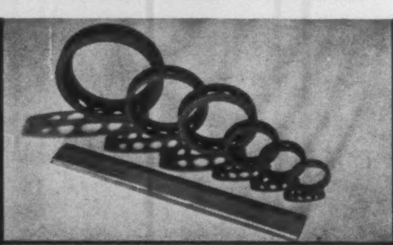
CDF can provide both quality and true economy in selecting plastic materials best suited to your needs. Refer to SWEETS PD file or write to us for General Folder 60.

CONTINENTAL-DIAMOND FIBRE

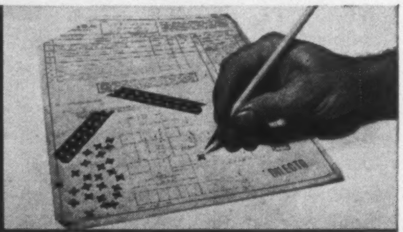
A SUBSIDIARY OF THE Budd COMPANY • NEWARK 85, DEL.
In Canada, 46 Hollinger Road, Toronto 16, Ont.



Moisture-resistant and low cost Dilecto cams for automatic washer and dryer controls.



Dimensionally stable, light weight, oil-resistant Dilecto ball bearing retainer rings.



Easily fabricated paper-base, punching grade Dilecto precision switch insulators.

COMING EXHIBITS

Western Tool Show—Nov. 14-18. Memorial Sports Arena, Los Angeles. (American Society of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38.)

Power and Mechanical Engineering Show—Nov. 28-Dec. 2, Coliseum, New York. (American Society of Mechanical Engineers, 29 W. 39th St., New York 17.)

Plant Maintenance & Engineering Show — Jan. 23-26, International Amphitheatre, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

MEETINGS

NOVEMBER

National Assn. of Secondary Material Industries and the **Institute of Scrap Iron & Steel**—Joint Pacific Coast conference, Nov. 13-15, Beverly Hilton Hotel, Los Angeles. Headquarters: NASMI, 271 Madison Ave., New York 16; ISIS, 1629 H St., N.W., Washington 6, D. C.

Steel Founders' Society of America—Technical and operating conference, Nov. 14-16, Hotel Carter, Cleveland. Society headquarters, Terminal Tower, Cleveland 13.

National Electric Mfrs. Assn.—Annual convention, Nov. 14-17, Hotel Traymore, Atlantic City, N. J. Association headquarters, 155 E. 44th St., New York.

Wire Assn. — Annual convention, Nov. 14-17, La Salle Hotel, Chicago. Association headquarters, 453 Main St., Stamford, Conn.

Building Research Institute—Fall conference, Nov. 15-17, Shoreham Hotel, Washington, D. C. Society headquarters, 2101 Constitution Ave., N. W., Washington 25, D. C.

Copper & Brass Research Assn.—Fall meeting, Nov. 16-17, Castle Harbour Hotel, Bermuda. Association headquarters, 420 Lexington Ave., New York 17.

National Warm Air Heating & Air Conditioning Assn.—Annual con-

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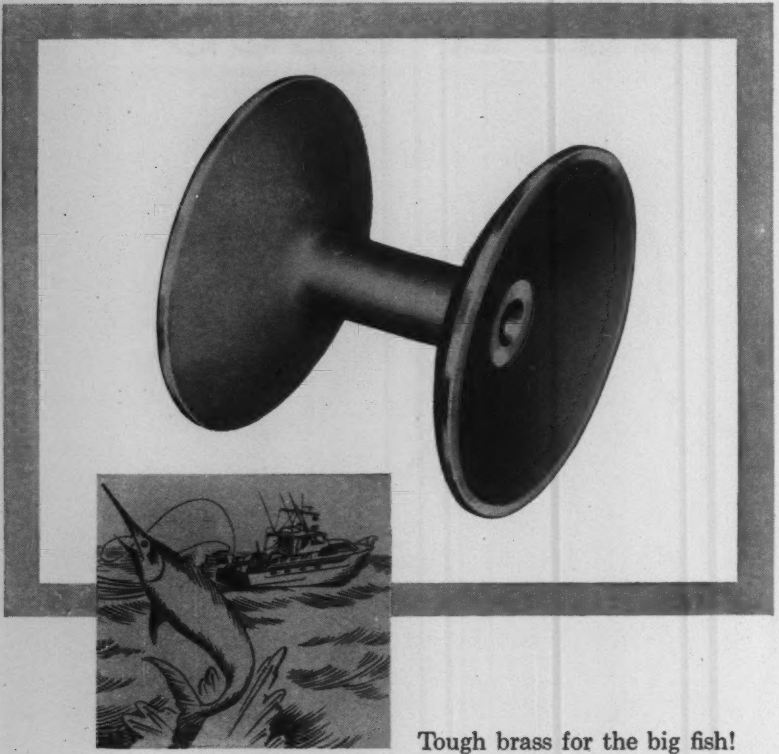
LOOK what brass is doing now!



Tough brass for the big fish!

Here's a *unique* deep-sea fishing reel spool converted to a Titan brass pressure die-casting. Fishermen found that the previous spool of the reel buckled under convulsive pressure of deep-sea marlin and tuna on modern fishing lines.

Stronger, wear-resistant, corrosion-resistant Titan brass die casting solved the problem. In fact, the higher strength of this die casting allows even thinner, streamlined spool sections. And here's the unique part: It's a spool in *one piece!* . . . all because of Titan brass ingenuity.

Like advantages can be yours when you switch to Titan brass pressure die castings. Let us help design and quote on your component parts.

Call your nearest Titan Man for detailed data and a brass die casting quote, or send your sample and blueprint to Bellefonte, Pa., or Newark, Calif., for fast service.

Send for latest folder on Titan Pressure Die Castings

Write us on your letterhead

Titan® METAL MANUFACTURING CO.
DIVISION OF CERRO DE PASCO CORPORATION
Bellefonte, Pa. Newark, Calif.
OFFICES & AGENCIES IN PRINCIPAL CITIES
45 years of quality brass

MEETINGS

vention, Nov. 16-17, Statler-Hilton Hotel, Cleveland. Association headquarters, 145 Public Square, Cleveland.

Aircraft Industries Assn. of America—Fall meeting, Members & Board of Governors—Nov. 16-18, Phoenix, Ariz. Association headquarters, 610 Shoreham Bldg., Washington, D. C.

American Mining Congress—Coal Div. conference, Nov. 18, Penn Sheraton Hotel, Pittsburgh. Headquarters, 1200 18th St., N. W., Washington, D. C.

Fluid Controls Institute—Fall meeting, Nov. 20-22, The Drake, Chicago. Institute headquarters, P. O. Box 667, Pompano Beach, Fla.

Electronic Industries Assn.—Winter conference, Nov. 29-Dec. 1, Fairmont Hotel, San Francisco. Association headquarters, 1721 DeSales St., N. W., Washington, D. C.

Iron & Steel Div., The Metallurgy Society of AIME—Annual Electric Furnace Committee conference, Nov. 30-Dec. 2, Morrison Hotel, Chicago. Society headquarters, 29 W. 39th St., New York 18, N. Y.

DECEMBER

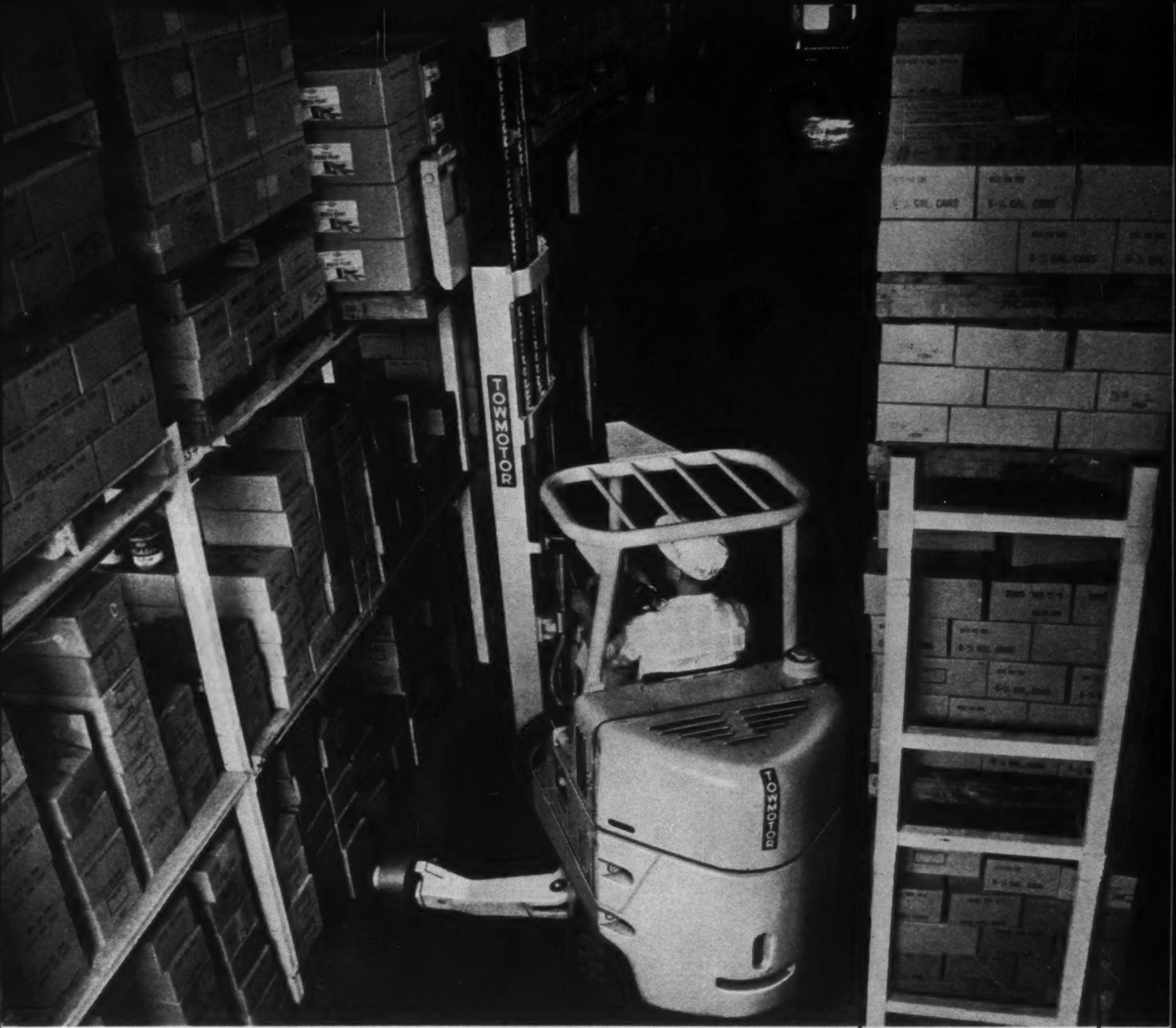
American Institute of Chemical Engineers—Annual meeting, Dec. 4-7, Statler Hotel, Washington, D. C. Institute headquarters, 25 W. 45th St., New York.

American Mining Congress—Annual membership meeting, Dec. 5, Plaza Hotel, New York. Headquarters, 1200 18th St., N. W., Washington, D. C.

The Electric Overhead Crane Institute—Annual meeting, Dec. 6, Carlton House, Pittsburgh. Institute headquarters, One Thomas Circle, Washington 5, D. C.

JANUARY

The Institute of Scrap Iron & Steel, Inc.—Annual convention, Jan. 8-11, Hotels Fontainebleau and Eden Roc, Miami Beach, Fla. Institute headquarters, 1729 H St., N. W., Washington 6, D. C.



Now reduce aisles to 6′ – capture ←36%→ "lost" storage space – as Glidden did!

By purchasing the Towmotor "Naro-Aisle-Stack" Series fork lift truck pictured above, The Glidden Company realized an immediate 36.8% gain in storage capacity at their Reading, Pa. warehouse.

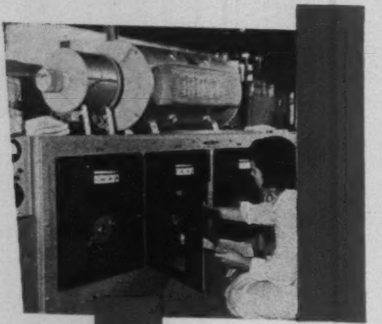
Reducing 9′ 6″ wide aisles to six feet enabled the new lift truck—which stacks heavy loads 90° left or right in the narrow aisles—to bring Glidden many other advantages as well. Now 42% more Glidden products are warehoused. Order filling and shipping are expedited. And the cost of additional warehouse facilities was averted.

Find out how this new "Naro-Aisle-Stack" Series truck can save *your* space, time and dollars as it has for The Glidden Company. Write for new booklet, "Captures Lost Space." TOWMOTOR CORPORATION, CLEVELAND 10, OHIO.

NEW "NARO-AISLE-STACK" SERIES FORK LIFT TRUCKS DESIGNED AND BUILT BY...

TOWMOTOR -GERLINGER
THE ONE-MAN-GANG ®

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919
Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation



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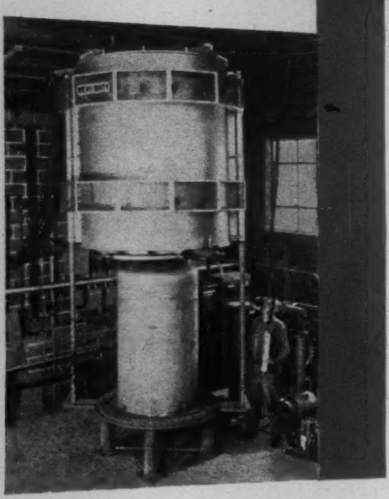
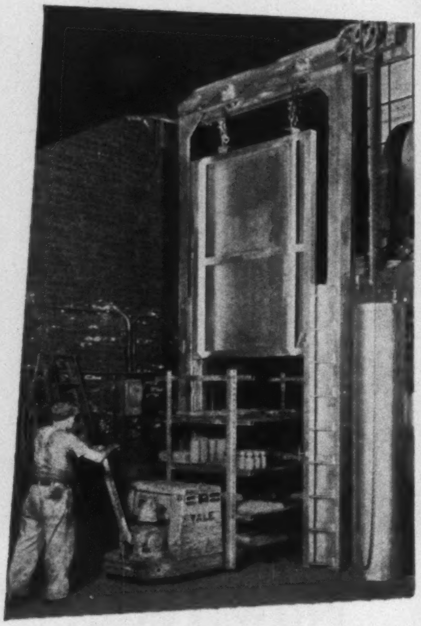
fuel-fired and electric . . .

Non-ferrous metal melting furnaces,
fuel-fired and electric . . .

Industrial ovens, fuel-fired
and electric . . .





AND NOW

induction melting furnaces . . . .

A full line of sizes and types for steel, cast iron, aluminum, copper, magnesium, silver and their alloys. Designed by a leading European producer of induction melting equipment and proven in hundreds of installations throughout the world. Get the full details from your Hevi-Duty sales engineer or

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Basic Products
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Hevi-Duty Electric Company, Watertown, Wisconsin

From Norton... Higher Speeds for Faster Grinding ...Cylindrical or Surface

For your cylindrical grinding

... Norton brings you cylindrical grinders which provide a new higher wheel speed of 8500 SFPM. In test after test Norton Machines using "high-speed" Norton wheels have proved their ability to operate at this new high speed — safely, steadily and with production advantages never obtained before.

These Norton cylindrical production grinders — now called the Series 8500, and so identified with a name plate — include the Type CTU Cylindricals, Angular Wheel-Slide grinders, No. 2 Centerless and the Type CP-1 PLUNG-O-MATIC®. Similarly, Norton high-speed wheels have been tested and approved for 8500 SFPM and carry the new checkered-flag stencil.

Remember: *it took a great deal more than stepping up spindle speeds to assure the greater productivity of Series 8500 machines.*

Fluctuations in wheel energy, mechanical energy, tangential force and many other factors had to be carefully considered before final approval of designs.

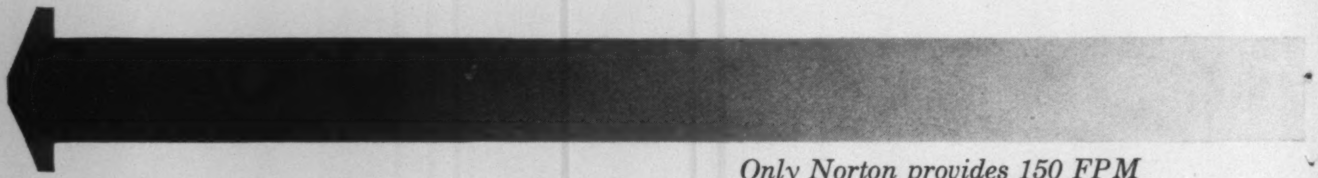
As a result, Series 8500 grinders produce more pieces-per-hour at lower cost-per-piece . . . provide finer finishes for improved product quality . . . and their higher speed reduces wheel dressings for longer wheel life and lowered wheel cost.

For your surface grinding

... Norton Type S-3 hydraulic surface grinders are now available with table speeds stepped up to a new high of 150 FPM.

This is another Norton achievement to bring you faster production than ever before. And, like the Series 8500, the Type S-3's are engineered to provide better production and product quality as a benefit of higher table speed.

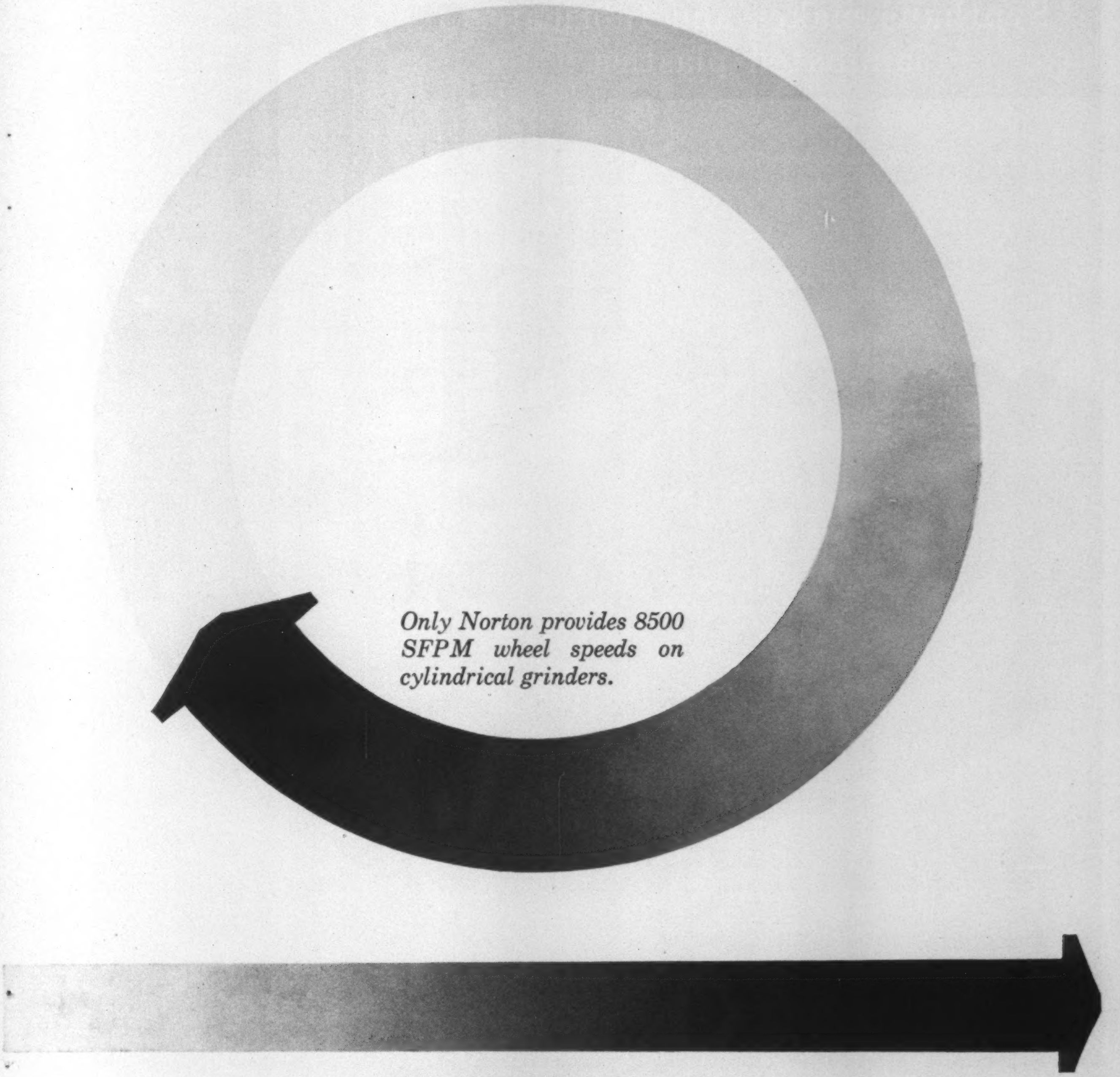
Available in 6″ x 18″ and 8″ x 24″ sizes, Type S-3 surface grinders are fast and accurate on long production runs or toolroom grinding. They handle taller workpieces . . . are equipped for fast positioning, better sighting and loading . . . and their faster table speeds mean less heat damage to workpieces.



Only Norton provides 150 FPM table speeds on surface grinders.

Learn how Norton developments are bringing more and more advantages of the speed age to many types of grinding. And call your Norton Man — a trained Grinding Engineer — for details on how these advantages can be brought to your own production. Or write to NORTON COMPANY, Machine Tool Division, Worcester 6, Massachusetts.

District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.


Only Norton provides 8500 SFPM wheel speeds on cylindrical grinders.

NORTON

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75 years of... Making better products
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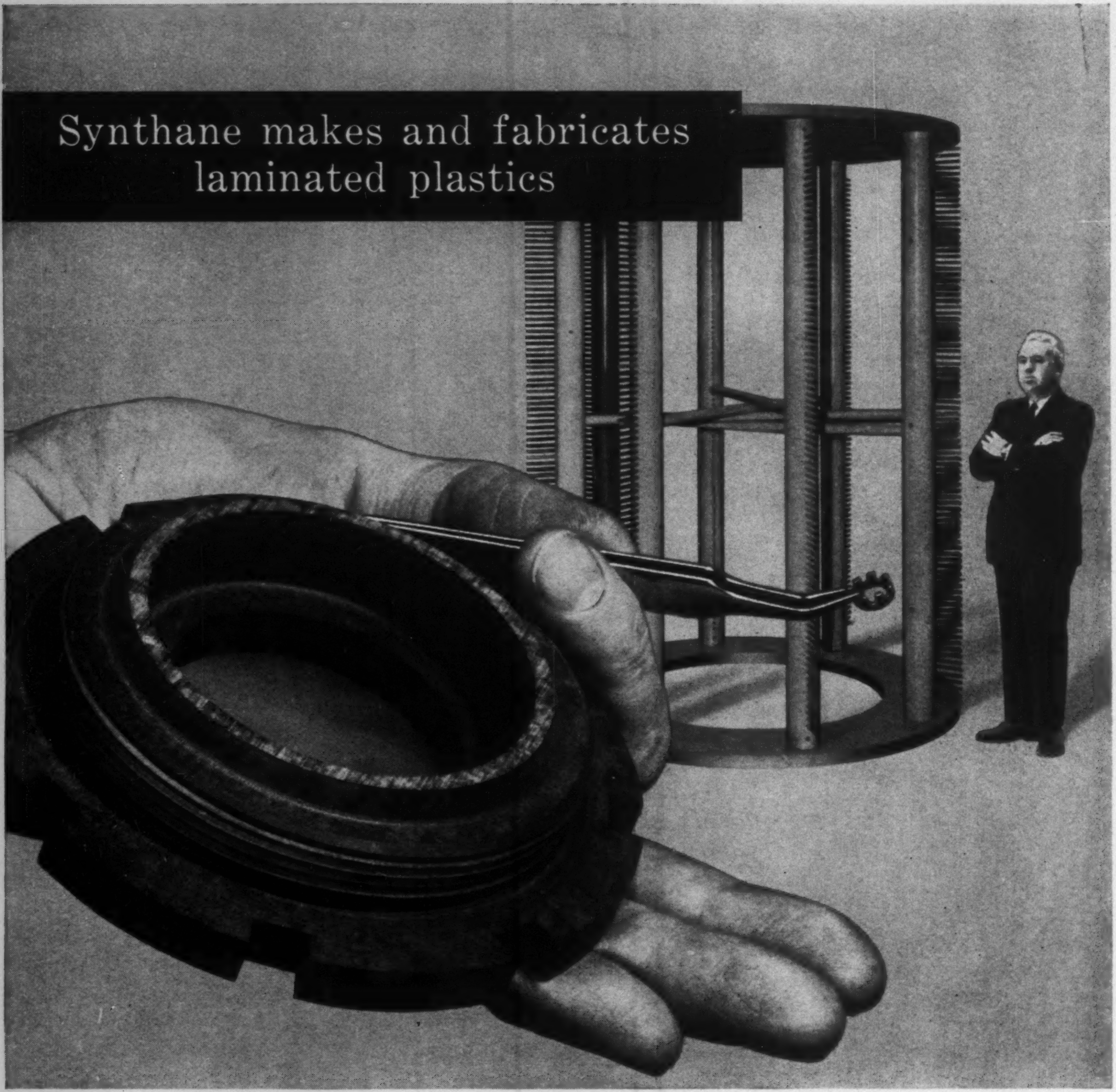
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners



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Molded-laminated • Molded-macerated

WESTINGHOUSE PRODAC BOSSES NEW 53" BLOOMING MILL

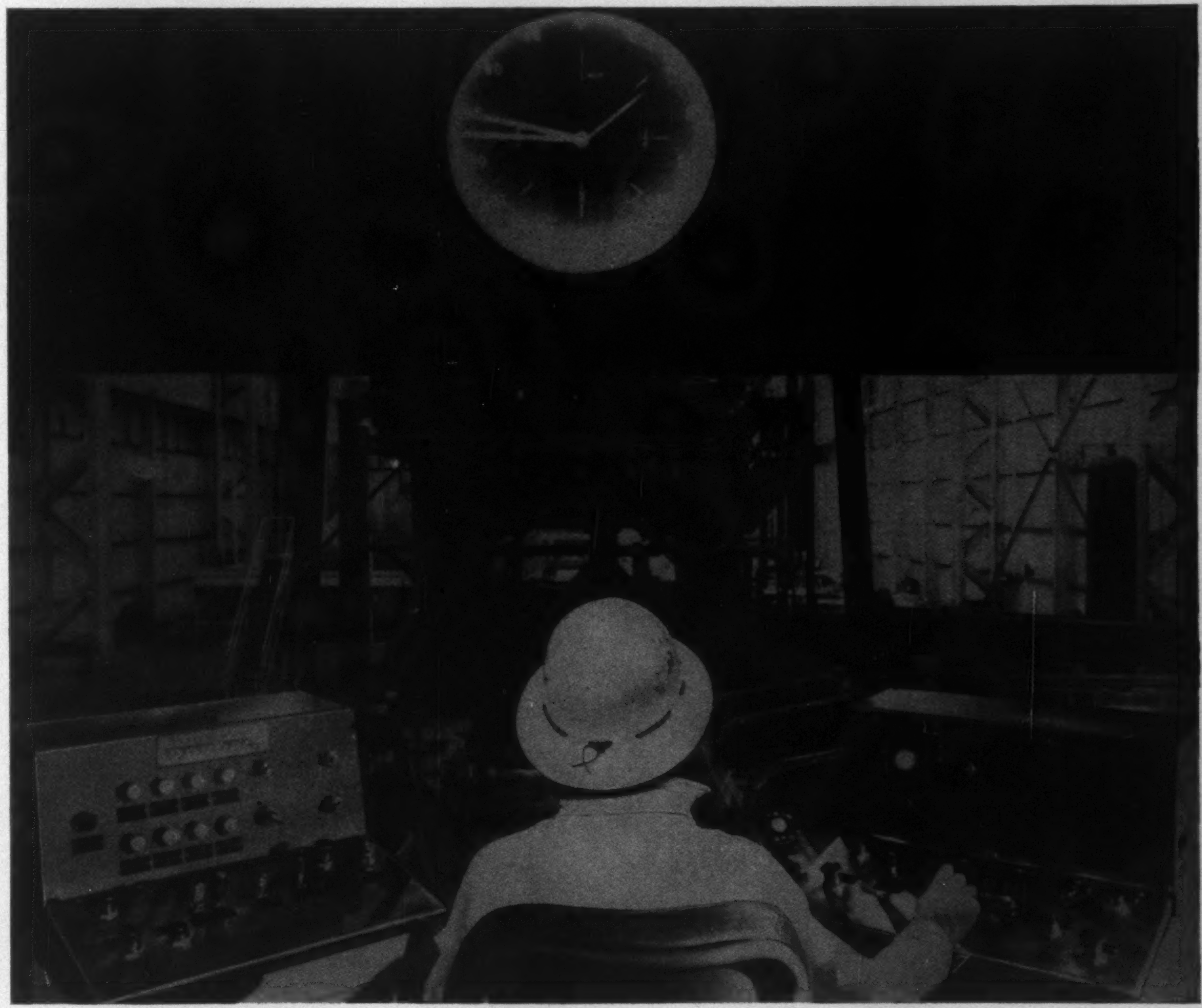
Punched cards whip through a reader . . . and the new 53" blooming and slabbing mill at U.S. Steel's South Works automatically squeezes 20-ton white-hot ingots into blooms. Bossing the complete operation: Westinghouse PRODAC* control, the first fully automatic control applied to a blooming and slabbing mill.

PRODAC control is one way U.S. Steel is tackling the challenge of increasing productivity. PRODAC slashes time delays between passes, utilizes full mill capacity, and eliminates human error to assure consistent, efficient operation.

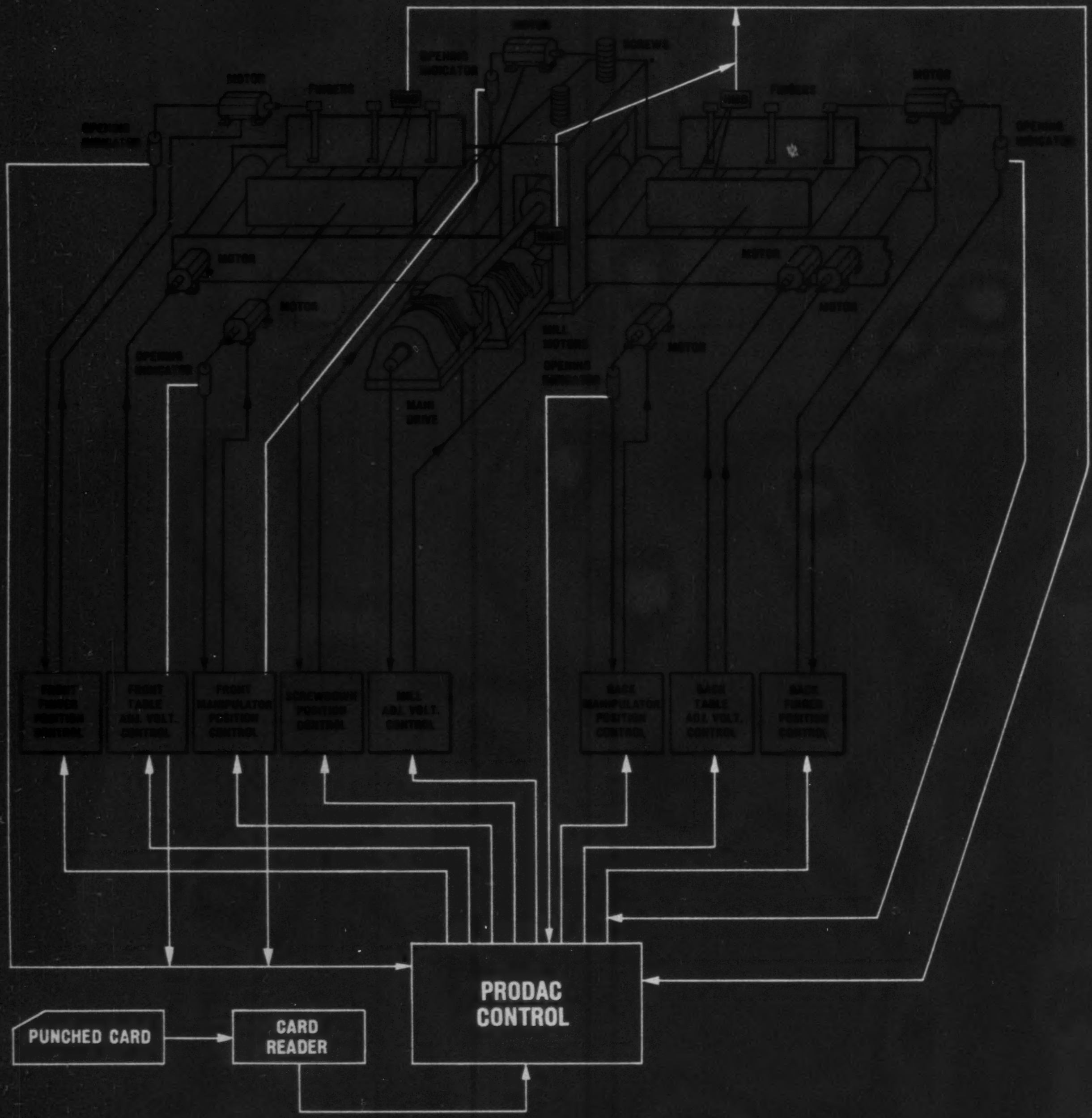
Turn the page and you'll learn exactly how PRODAC goes about bossing the mill. *Trade-Mark
J-96155

STRADDLING THE MILL TABLES is pulpit from which operator monitors mill performance. Compact desks containing unique, miniaturized controls may be operated manually if necessary. Card reader is accessible to operator for new schedules.

Westinghouse



53" BLOOMING AND SLABBING MILL


MOTOR
SCREWS
OPENING INDICATOR
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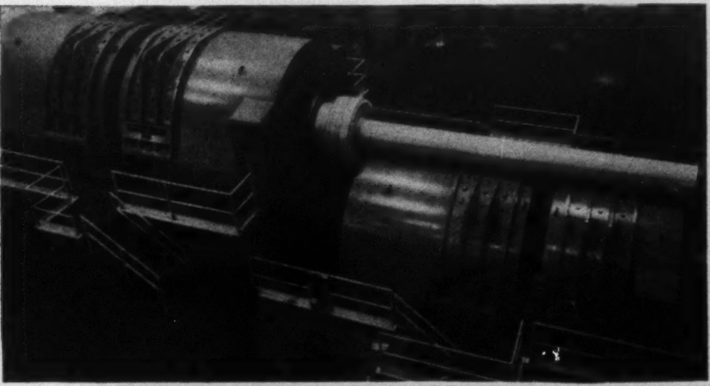
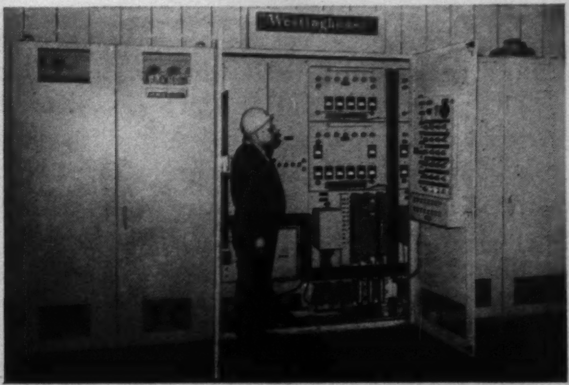
OPENING INDICATOR
MILL MOTORS
OPENING INDICATOR
MOTOR
MAIN DRIVE
FRONT FINGER POSITION CONTROL
FRONT TABLE ADJ. VOLT. CONTROL
FRONT MANIPULATOR POSITION CONTROL
SCREWDOWN POSITION CONTROL
MILL ADJ. VOLT. CONTROL
BACK MANIPULATOR POSITION CONTROL
BACK TABLE ADJ. VOLT. CONTROL
BACK FINGER POSITION CONTROL
PRODAC CONTROL
PUNCHED CARD
CARD READER

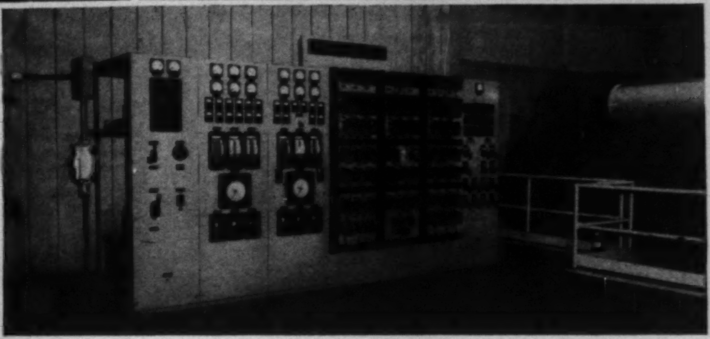
MILL MUSCLES are dependable Westinghouse motors. Here is the 12,000-hp, 40/80-rpm twin drive (foreground) with 10,000-kw flywheel m-g set.



MILL BRAIN is PRODAC control system, housed in compact cabinet, which automatically operates mill by duplicating manual actions on a predetermined sequence.



PRODAC COMMANDS ALL MILL OPERATIONS . . . EVEN INGOT TURN



THE MAIN DRIVE CONTROL features rugged steel panel construction.

PRODAC directs U. S. Steel's new blooming and slabbing mill from only three punched cards. They contain all operating information needed to execute a rolling schedule of as many as 29 passes. As shown on the diagram opposite, the cards are fed into a card reader by the operator and the data is stored in PRODAC's memory. The operator hits a button . . . PRODAC takes over.

FOR EACH PASS, PRODAC uses the proper stored data to send signals to appropriate control elements. Main drive entry speeds, acceleration and deceleration rates are precisely regulated. Screwdown openings are positioned to a final accuracy band of ±1/32″ over a 60″ opening range, while sideguards are positioned to ±1/2″ accuracy band over a 120″ range.

At PRODAC's direction, manipulator fingers turn the ingot by lifting to any of seven heights. Mill feed rolls and tables match their speed to the main drive and, on direction, adjust themselves to a present draft compensation. PRODAC control also provides for tandem rolling during early passes.

WHEN A PASS IS COMPLETED, hot metal detectors report the ingot ready for the next pass, and PRODAC sets up the mill. One schedule can be repeated for successive ingots or, for a different schedule, the operator inserts new cards and lets PRODAC carry on.

J-96155-3

Westinghouse

WHEN PRODAC SIGNALS, WESTINGHOUSE MILL DRIVES RESPOND INSTANTLY

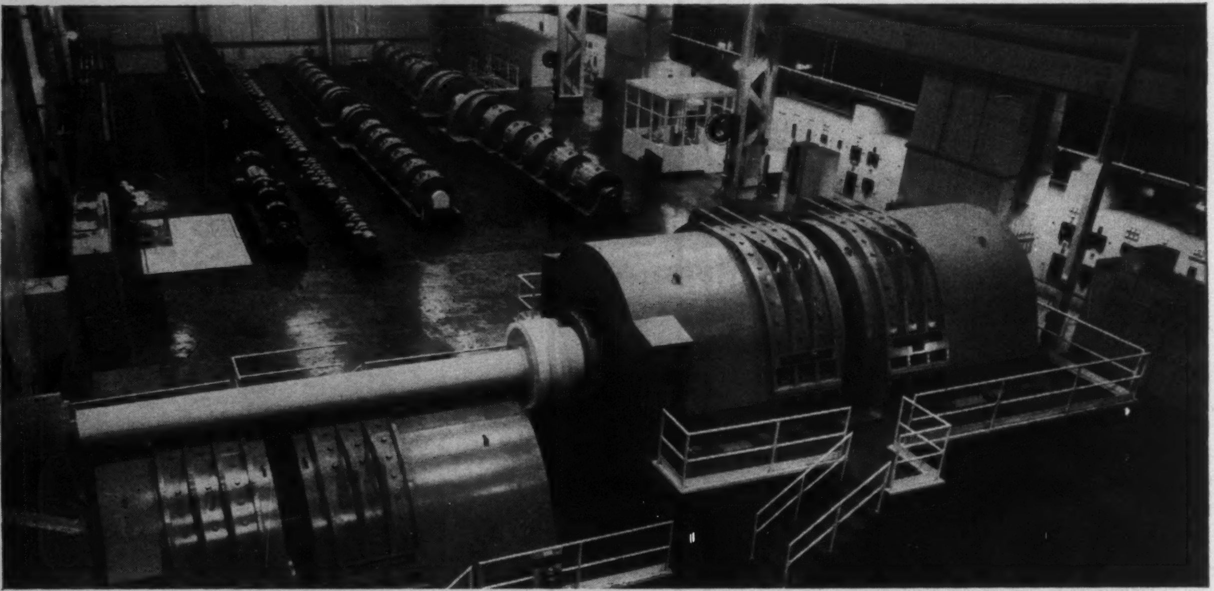
The Westinghouse drive system and related power equipment share the spotlight with PRODAC in the successful automation of U.S. Steel's blooming and slabbing mill.

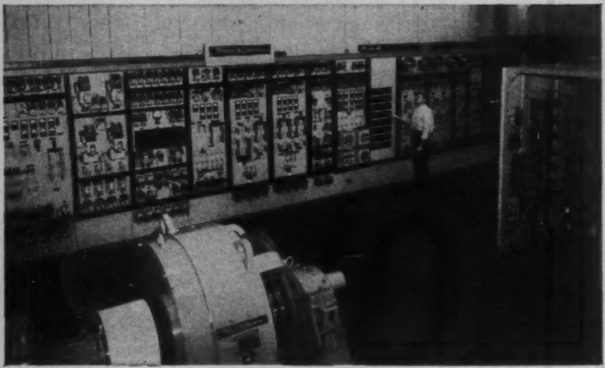
The 12,000-hp main mill drive consists of two 6000-hp double armature twin motors. The screwdown, manipulators, fingers, and front and back table and feed rolls each have Westinghouse adjustable voltage drives complete with Magamp regulators. Complete engineering and coordination of these drives assure the instantaneous response to PRODAC's commands critical to keeping the mill on schedule.

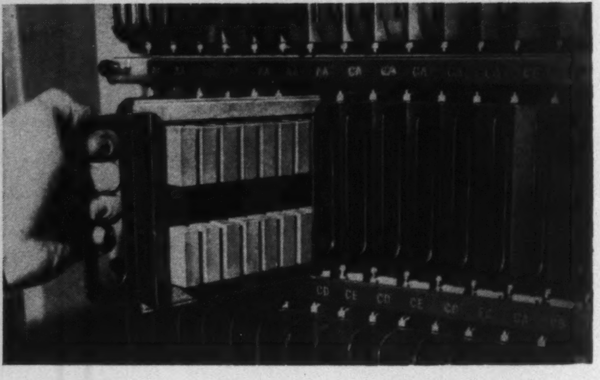
PRODAC control like that for U.S. Steel is a key element in Westinghouse *Progressive Automation*. This new concept aims at helping steel producers boost product quality and quantity through economical, step-by-step automation. Your Westinghouse representative has details on *Progressive Automation* . . . and PRODAC. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. *You can be sure . . . if it's Westinghouse.* J-96155-1-4

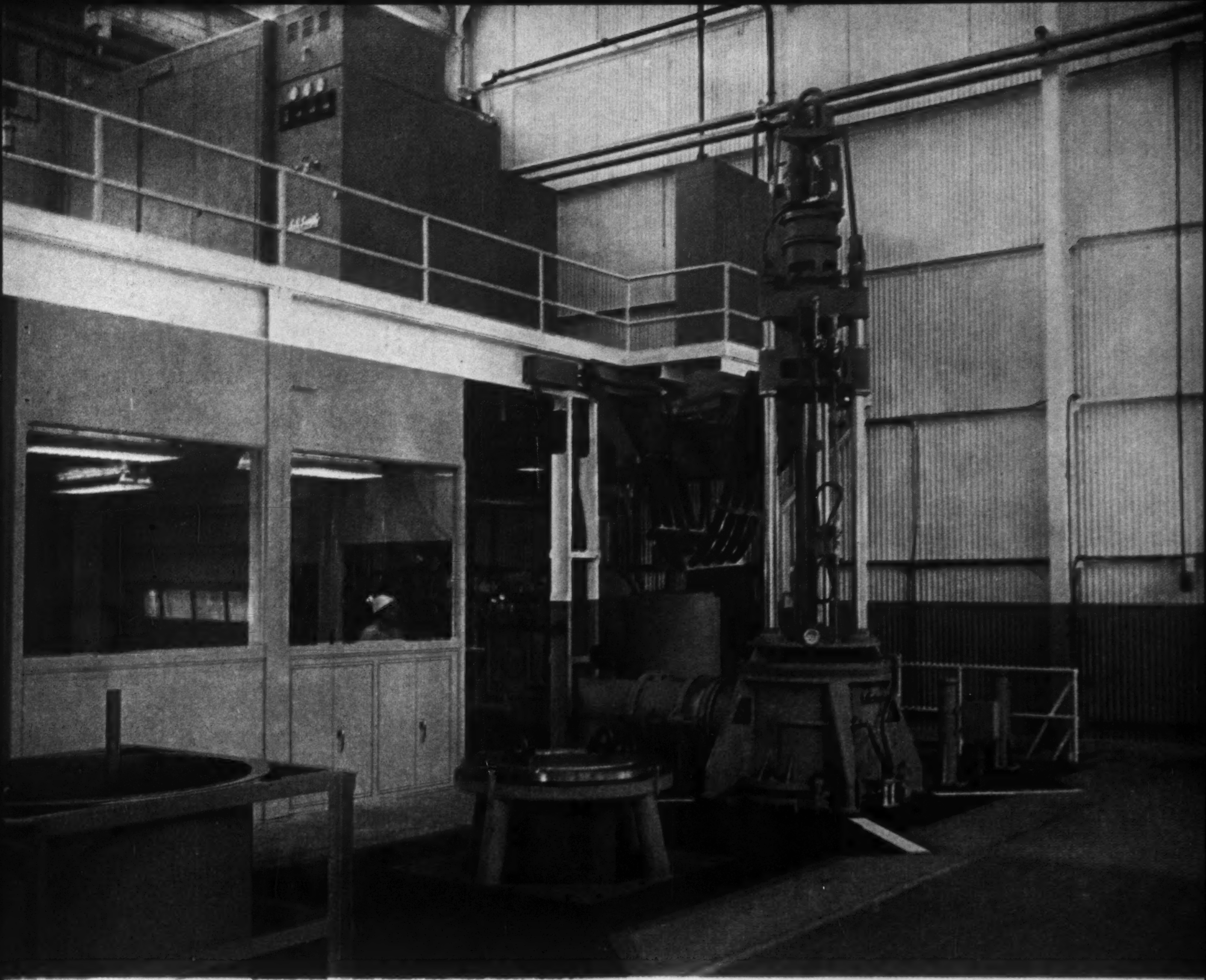
Westinghouse

12,000-HP MAIN MILL DRIVE (foreground) with auxiliary m-g sets and exciters (upper). **THE FIRST ALL-STEEL PANEL** construction is utilized in this variable voltage auxiliary control (lower left). **SINCE THE INSTALLATION** of the mill, the PRODAC module, representing a circuit function, has been refined. The new module is shown below and is easily accessible for removal or replacement (lower right).









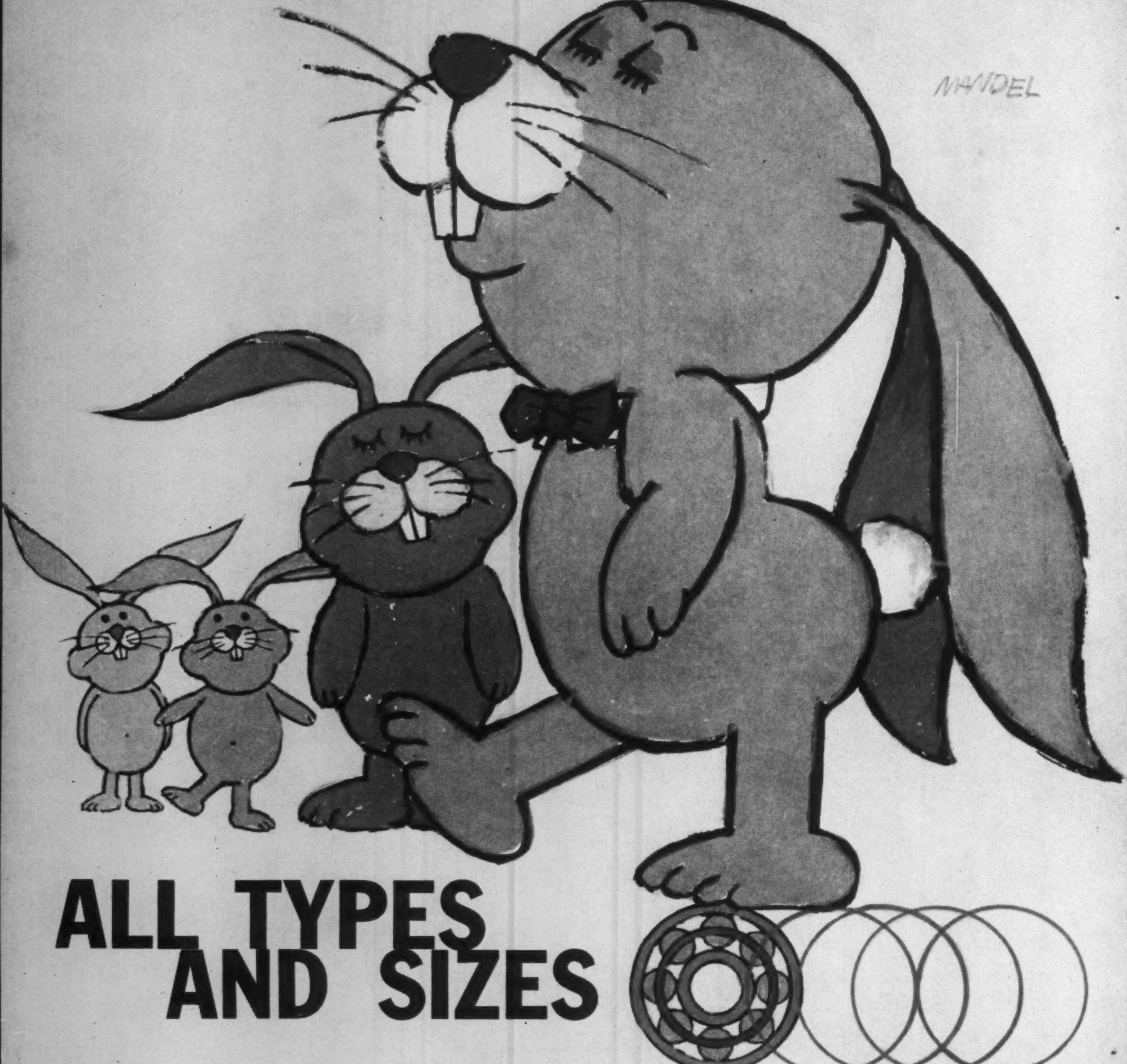
SPECIAL QUALITY STEELS AVAILABLE AT STANDARD

One of the largest vacuum arc remelt furnaces in the country—the first of four to be installed—is now in operation at Standard Steel Works Division of Baldwin-Lima-Hamilton Corp. This new facility, together with electric melting furnace and vacuum degassing equipment acquired recently, now makes it possible for Standard to deliver "laboratory-quality" steels in production quantity.

Standard is now capable of producing vacuum remelt quality ingots, up to 30-inch diameter, in all of the super-strength steels and special alloys requiring exceptional quality. Standard continues to offer superior service and superior materials to American industry. We especially welcome forging and ring inquiries for tools, missiles, turbines, bearings and similar applications for super-strength, heat-resistant, corrosion-resistant and other special alloys.

Standard Steel Works Division
BALDWIN · LIMA · HAMILTON
BURNHAM, PENNSYLVANIA

Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes



ALL TYPES AND SIZES

Here at Federal, we're proud fathers to over 12,000 different sizes of ball bearings and hundreds of types. A fine family and still growing, (not that we want to boast.) 12,000 strong, they stand ready to satisfy almost any application need that American industry can think of (and believe you us, American industry can think of some lulus). Would you like to meet the Federal family? We just happen to have their pictures — and names and numbers — in the form of a handy catalog which we'll ship you at the drop of a letterhead. Best looking, hardest working bunch of ball bearings you've ever seen. Write for it today.

THE FEDERAL BEARINGS CO., INC., Poughkeepsie, N. Y.

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BALL BEARINGS

One of America's largest ball bearing manufacturers

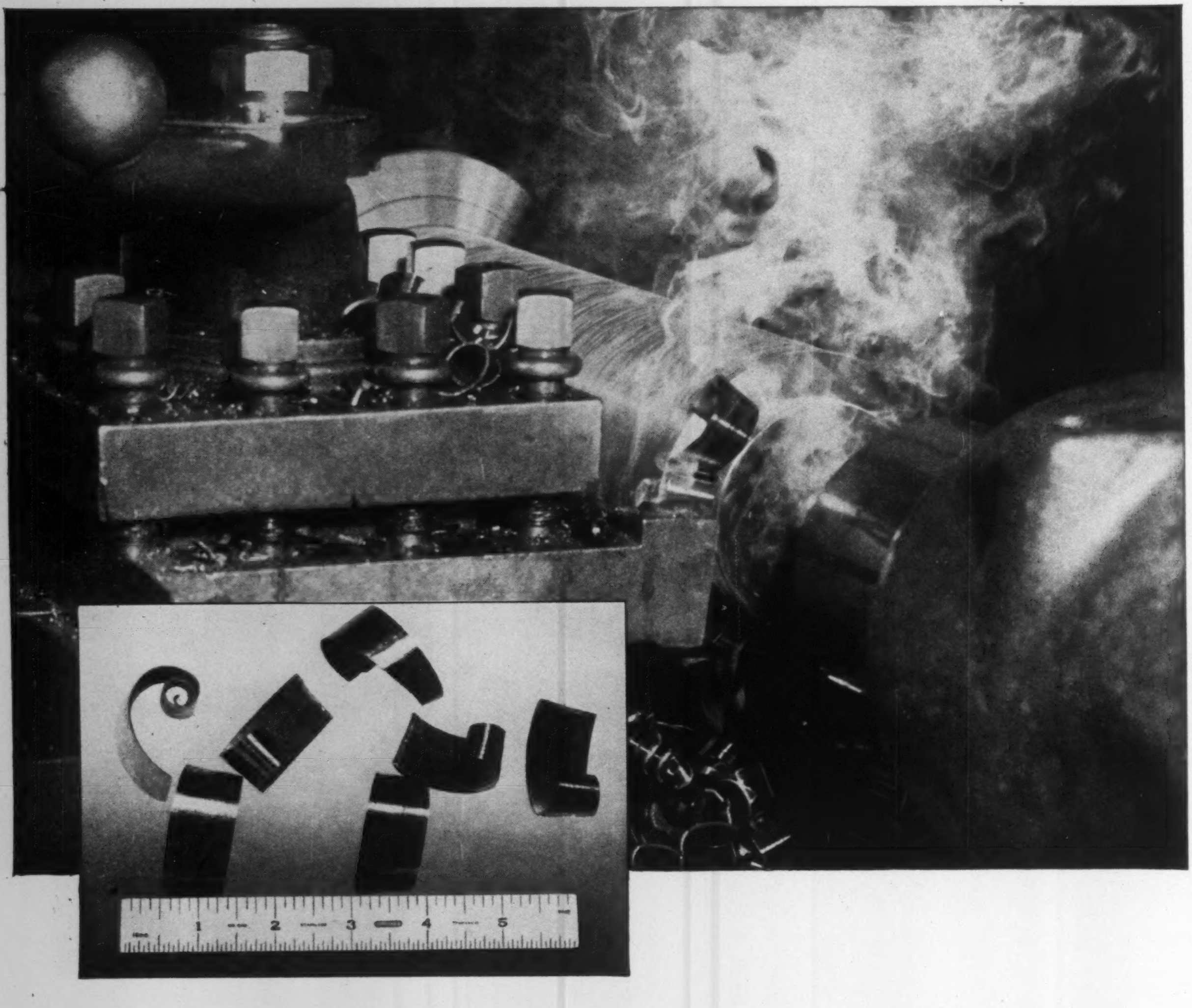
FEDERAL ON FILM—A 16 mm. color sound film takes you through our 400,000 sq. ft. plant. Loaned free. Just ask for it.

BLAW-KNOX

WIDE FLANGE BEAM and STRUCTURAL MILLS

Blaw-Knox designs and builds a full range of Wide Flange Beam and Structural Mills. Other Blaw-Knox equipment for the metals industry includes: Complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals • Sheet and strip processing equipment • Electrolytic tinning, annealing, and galvanizing lines • Seamless pipe and tube mills • Draw benches and cold draw equipment • Blaw-Knox Medart cold finishing equipment • Iron, alloy iron and steel rolls • Carbon and alloy steel castings • Fabricated steel plate or cast-weld design weldments • Steel plant equipment • Heat and corrosion resisting alloy castings. Blaw-Knox Company. Foundry and Mill Machinery Division. Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

Wide Flange Beam and Structural Mill at the South Works of the United States Steel Corporation



Chips like these boost machine output at HEWITT-ROBINS

The ability of VR-77 on heavy interrupted cuts gives Hewitt-Robins maximum machine output per dollar of machine investment. At their Robins Conveyors Division Plant in Passaic, New Jersey, VR-77 is used for maximum metal removal on 1045 cold rolled steel, taking a 0 to ⅞″ cut at 300 s.f.p.m. with a .026″ feed. Downtime has been cut in half because VR-77 removes twice as much metal per index as the previously used carbide brand.

Regardless of your particular machining problem, there's a V-R carbide specifically engineered to help you boost your machine output.

Send for Catalog
VR-58 for
complete details.

CREATING THE METALS THAT SHAPE THE FUTURE

V-R® VASCOLOY®-RAMET

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C-773

YOUR MOST OVERPAID OPERATOR

Are you *sure* you are making full use of the manpower and the machine productivity you are paying for? Are you handicapping your operator—tying him to inefficient, obsolete equipment? You may be doing just that, even though your equipment is just ten years old—for the average ten-year-old is only 60% as efficient as its 1960 successor.

AUTOMATIC LATHES CUT COSTS

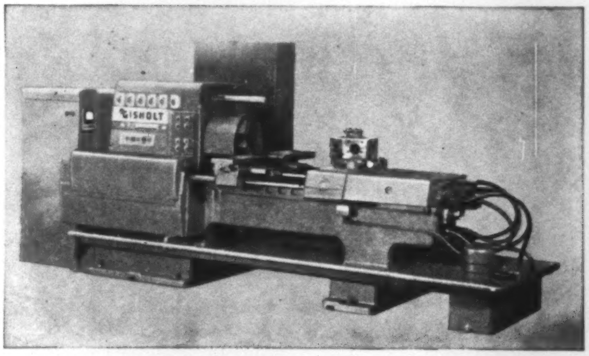
With increased competition and rising costs, increased production efficiency is vital if profit levels are to be maintained. More and more plants are turning to the advantages of automatic lathes.

Lower costs, less dependence on operator skill, faster production on a wide variety of jobs—these are just a few of the many benefits offered by the Gisholt family of automatic lathes.

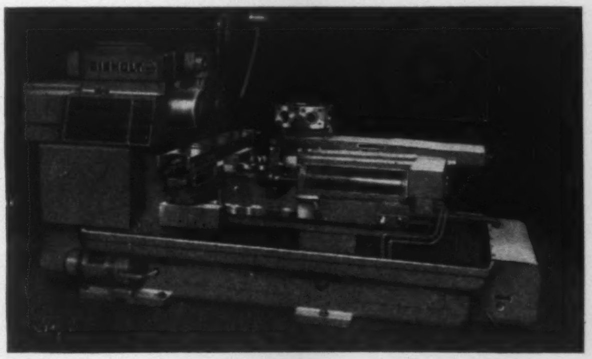
BOOST OPERATOR PRODUCTIVITY

These new Gisholts handle intricate machining steps in rapid sequence—automatically—allowing your operators to handle two or more machines without extra effort.

Get all the facts now—call your Gisholt Representative or write for literature on the Gisholt machines shown—the Fastermatic with new FeeDial® control and the AR Turret Lathe.



Gisholt MASTERLINE AR®
Automatic Ram Turret Lathe



Investigate Gisholt's Extended Payment and Leasing Plans

GISHOLT® MASTERLINE GISHOLT SINCE 1887

GISHOLT® MACHINE COMPANY
Madison 10, Wisconsin

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*

"Global Design of Our New Constellation Vacuum Cleaner Calls for Deep-Draw Quality, Excellent-Surface J&L Steel"

. . . The Hoover Company

The two hemispheres that make up the base and cover of the Hoover Constellation cleaner are each blanked from a flat piece of steel. With a single stroke of a stamping die, The Hoover Company forms perfect shells, 6.037 inches deep, for their Constellation cleaner. Key to this stamping operation is the excellent drawing quality of J&L 22-gage sheet steel.

Despite the severity of the draw, there are no breakage problems, no die mark problems, no "orange peeling" or strain lines.

Successful production of this spherical cleaner is possible because the J&L cold rolled sheet used at Hoover has three essential qualities: (1) Consistent Drawing Quality, (2) Excellent Surface Finish, and (3) No Age-Hardening.

Mr. Ralph O. Ross, Hoover's buyer of steel, believes: "Production would be vastly complicated, if not impossible, without cold rolled, drawing-quality, killed steel sheet. We would be hindered by metal breakage during the stamping operation, and troubled by die marks and surface imperfections on the completed spheres were it not for a number of advantages of the cold rolled sheet."

To get exactly the right J&L steel for special requirements in your own plant, contact your Steel Service Center. Or, write direct to *Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.*

Steel

This Steelmark identifies products made of steel. Place this mark on your products. And—look for it when you buy.

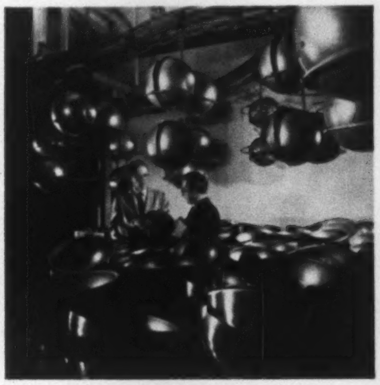
Jones & Laughlin Steel Corporation

3 Gateway Center, Pittsburgh 30, Pennsylvania

J&L STEEL

Above, left, 19-inch blanks are stamped from coils of J&L 22-gage drawing-quality cold rolled sheet steel. Flat blanks go next to a single-stroke drawing press which forms them into spherical shells.

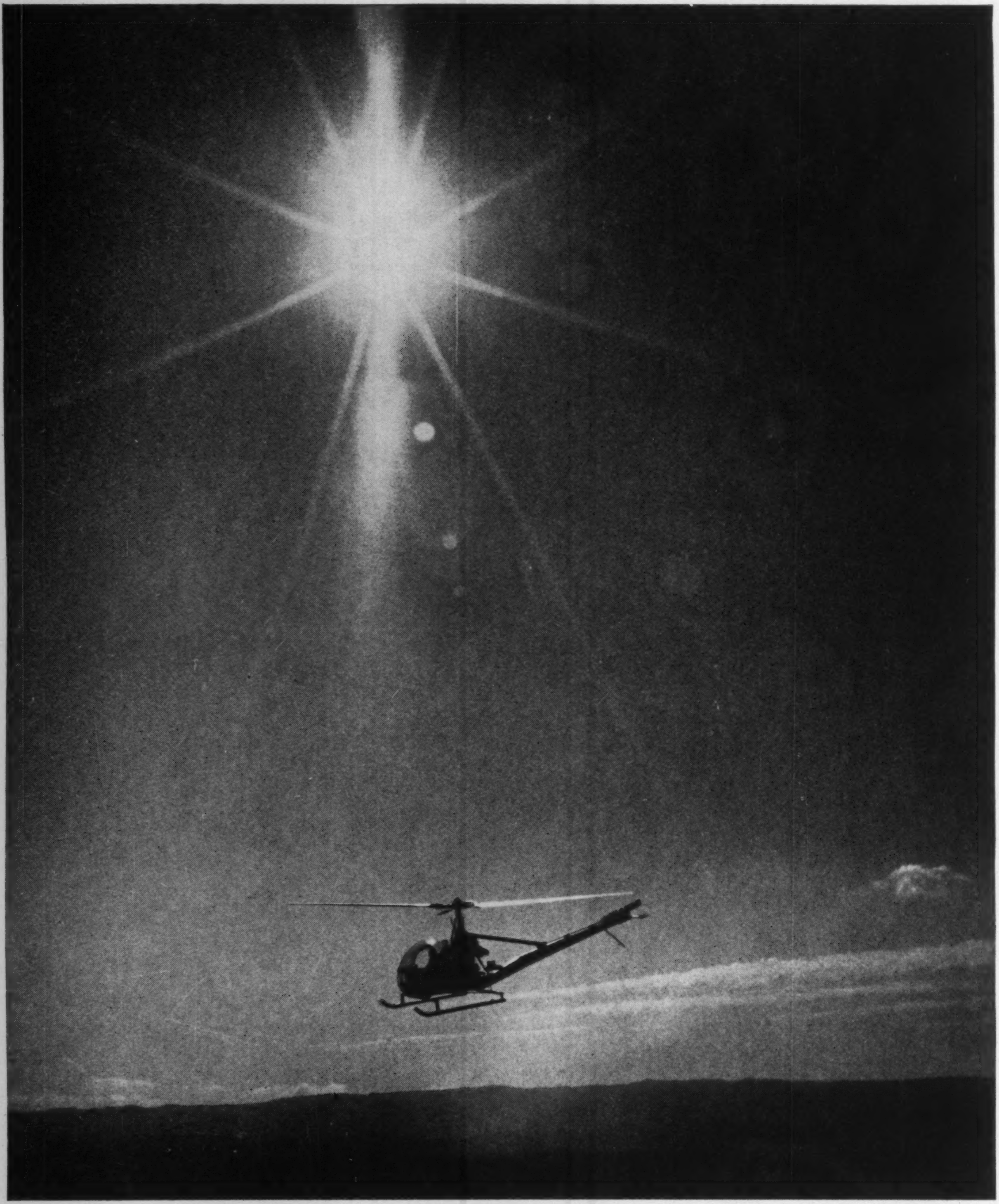
Severe draw forms shells into 6.037 or 6.027 inch deep hemispheres with single press stroke. This operator positions flat blanks and removes stamped shells by hand. Excellent drawing quality of J&L sheet virtually eliminates breakage, strain marks, and "orange peeling" problems.



Surface finishes are examined by Chief Inspector of Finished Products, William Bauman (left), and Steel Buyer Ralph O. Ross. Quality surface finish of J&L sheet has greatly reduced number of shells "wheeled" (ground) before painting.

▶

Final assembly is done by skilled men, each of whom puts together a complete cleaner. Each Hoover Constellation Cleaner is 100% inspected — electrically, functionally, and visually.



This bird grew up in a Gas-heated nest. The nest is the plant of Hiller Aircraft Corporation in Palo Alto, California, where gas is used exclusively in the heat processing of aircraft parts. From the big bubble up front to the rotor blades in its tail, nearly every part of a Hiller helicopter is processed with gas heat. Gas heat cures plastics, anneals metals, dries paint, heats solutions for plating . . . keeps the plant itself warm in winter. Hiller Aircraft—and thousands of other companies—use gas heat because it is completely controllable, fast, clean, economical. Gas is technically right and economically sound for all types of heat processing. Call the Industrial Sales Engineer at your local gas company for specific technical help. *American Gas Association.* **FOR INDUSTRIAL HEATING GAS IS GOOD BUSINESS**

Quality metal products deserve
"the finishing touch" of Mahon

another
example . . .
**fine office
furniture
from
General Fireproofing**

below: one of GF's new 1000 Series desks, part of a striking, new functionally designed business furniture line. At right: a stage of the complete finishing system designed and built by Mahon for GF's San Luis Obispo, Calif. plant.

Production finishing is the application of coatings of a specified quality at highest efficiency .That also sums up the business of Mahon's Industrial Equipment Division and they have learned it well . . . for over forty years . . . in hundreds of installations . . . for all types of finishing. Mahon metal-cleaning and metal-finishing systems will prove your best investment regardless of initial cost. In this highly specialized, multi-process area, can you afford less than the best for your quality products? Find out how Mahon's 'finishing touch' can improve your products . . . your costs . . . your sales. Call in Mahon.

WRITE FOR MAHON CATALOG A-660
ALSO IN SWEET'S P. E. FILE

MAHON INDUSTRIAL EQUIPMENT

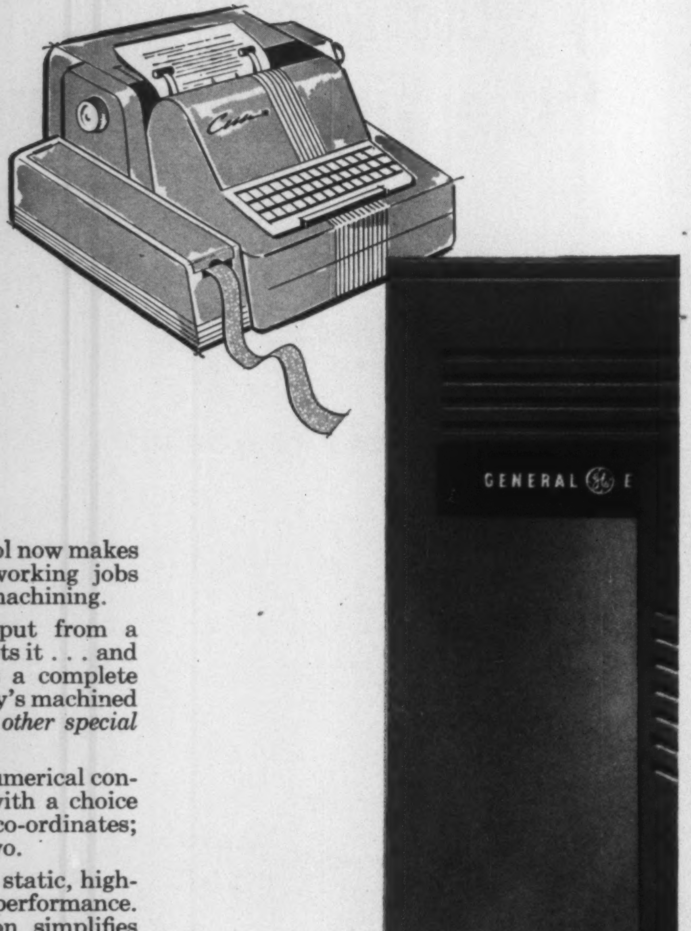
- Finishing Systems
- Metal Cleaning Equipment
- Painting Facilities—
  spray, dip and flo-coaters
- Drying and Processing Ovens
- Special Plant and
  Production Equipment

YOUR BIGGEST VALUE IS IN MAHON'S PLANNING & ENGINEERING EXPERIENCE

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York,
Chicago, San Francisco and Torrance.

MAHON

NOW... automatic contouring *without* a computer



New General Electric Mark Century numerical control now makes *computerless programming* a reality for most metalworking jobs . . . including all circular, angular, and straight-line machining.

This new control system takes punched-tape input from a standard automatic typewriter . . . reads and interprets it . . . and automatically commands the machine to carry out a complete machining cycle. Producing more than 85% of industry's machined parts can be as simple as that—*with no computer or other special equipment necessary!*

Contouring or absolute positioning—Mark Century numerical control comes in a compact, "building-block" package with a choice of: 1-, 2-, 3-, 4-, or 5-motion positioning to absolute co-ordinates; 2- or 3-motion contouring; or a combination of the two.

Solid-state devices, modular construction—Completely static, high-speed logic circuits mean long life and dependable performance. New General Electric plug-in, modular construction simplifies maintenance and inspection.

Another member of the G-E program control family—Mark Century control is the newest addition to General Electric's complete line. It supplements the industry-renowned Mark series of job-proved, low-cost numerical positioning control to bring *computerless programming* to America's metalworking industry.

See your machinery builder or G-E Sales Engineer today, and find out how General Electric numerical control can help you increase productivity and cut machining costs. Or, write for new bulletin to General Electric Company, Schenectady 5, New York. Specialty Control Dept., Waynesboro, Va. 795-11

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW MARK CENTURY

NUMERICAL CONTROL
FOR AUTOMATION

NUMERICAL CONTROL

MOVIE:
"STOP LOSS"
CO-ORDINATED
BOOKLETS
INFORMATIVE
FILM
PACKAGE
"STOP
LOSS"
Organized
Lubrication

MOVIE: "STOP LOSS WITH ORGANIZED LUBRICATION," a new 20-minute color-and-sound film created to show the opportunities for cost control through Organized Lubrication.

EDUCATIONAL FILM PACKAGE for plant departments consists of movies on greases, hydraulic oils, cutting oils, etc., that may be selected after seeing the "Stop Loss" film.

HERE ARE THE TOOLS THAT CAN HELP YOU

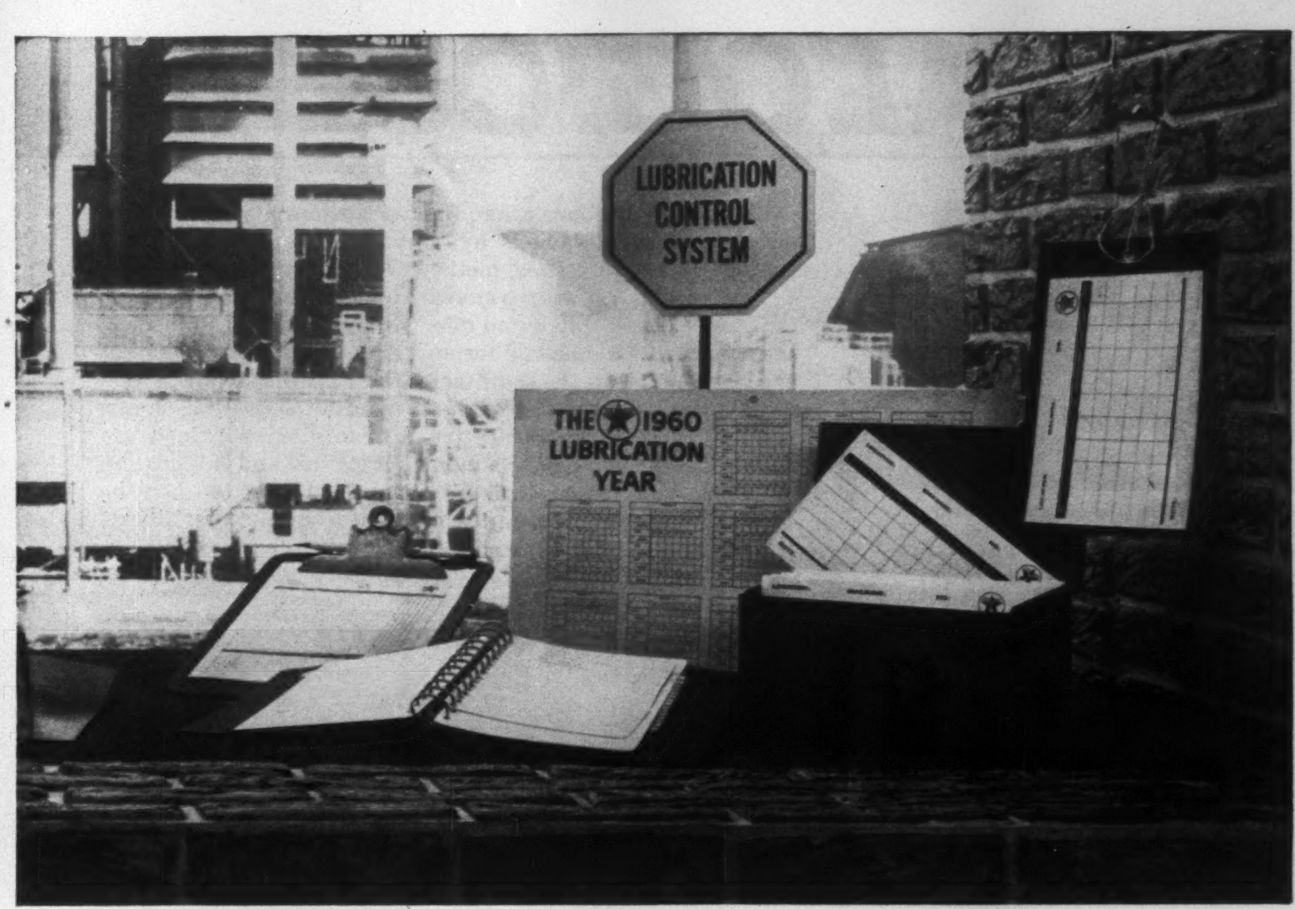
INCREASE YOUR NET PROFITS

Texaco's new "Stop Loss" program is designed to cut maintenance costs by modernizing lubrication practices. If yours is an average plant, the results can add 4 per cent to your net profit.

Even if your plant is an efficient operation, it is still virtually certain that there is an opportunity for cost control you are overlooking—either partially or completely. Here's what the Small Business Administration says in a recent publication:

Suppose there is an average plant, which sells $1,000,000 worth of goods per year. The net profit of this average company would be $73,400 and the maintenance cost would be $29,900. Now, suppose that by *better lubrication,* maintenance costs are reduced 10%, or $2990, *the $2990 will go directly into profit*—an increase of 4%.

A Texaco "Stop Loss" Program is designed for you. Texaco has developed a program specifically designed to help cut your maintenance costs via better lubrication practices. It will help you increase machine life, minimize downtime, reduce lube inventory, even cut purchasing costs. And the savings you make go directly into profits.



CO-ORDINATED BOOKLETS on the film subjects and others can be used as guides in specific areas.

TEXACO LUBRICATION CONTROL SYSTEM takes the guesswork out of your lubrication scheduling. It costs almost nothing to install, yet can add thousands of dollars a year to profits.

BY AS MUCH AS 4 PER CENT!

Can your plant pass this test? If the answer is "no" to any of the following questions, it is almost certain that a Texaco "Stop Loss" Program can improve your profit picture.

1. Is there a central source of responsibility in your plant for *all* lubrication? Yes ☐ No ☐
2. Can your machine operators devote all their time to production without worrying about lubrication? Yes ☐ No ☐
3. Is there any system for making sure that equipment gets lubricated in the right spots at the right time? Yes ☐ No ☐
4. Have you had a lubrication study made to eliminate costly duplication of lubricants? Yes ☐ No ☐
5. Are your oilers qualified men with knowledge of mechanisms lubricated? Yes ☐ No ☐

See for yourself how "Stop Loss" works! Texaco has just released a new color-and-sound movie to dramatize the benefits of good lubrication practices. It's called "Stop Loss through Organized Lubrication" and we think it would be valuable to you to see it. For a showing in your plant soon, mail in the coupon today!

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

MAKE YOUR RESERVATION TODAY!

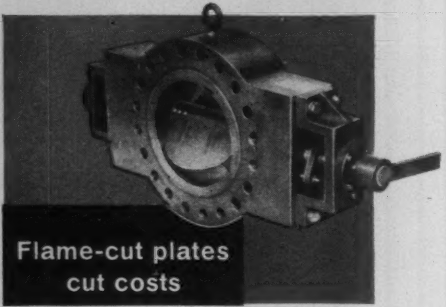
TEXACO INC., Dept. IA-162
135 East 42nd Street
New York 17, New York

I would like to see "Stop Loss through Organized Lubrication." Please call to arrange a showing in my plant.

TEXACO

Name________________ Title__________
Firm________________
Address________________
City________________ Zone____ State__________

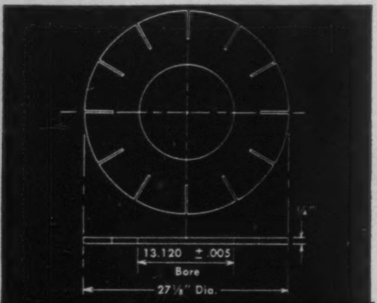
METALOGICS* IN



Flame-cut plates cut costs

HIGH REJECTS: Use of flat steel castings for valve bodies, with I. D. ranging from 4" to 60", accounted for increases in costs for this manufacturer. Pattern costs rose because of numerous changes . . . rejects were high due to porosity and other casting faults that showed up only after machining.

HIGH QUALITY: Ryerson recommended using flame-cut plates ranging in thickness from 1" to 8". Results: greater production flexibility, faster delivery, lower cost and a stronger product for this high-pressure service. Tight Ryerson quality control delivered plates of exceptionally clean surface to exact thickness of finished product, requiring little machining.



Machine cut rings solve problem

PLATES REQUESTED: Ryerson was asked to bid on supplying ¼" Type 410 stainless in 27½" square plates. Material was to be used for orifice plates for 16" burner, subjected to elevated temperatures.

RINGS RECOMMENDED: Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛"-diameter rings with 13.120" bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

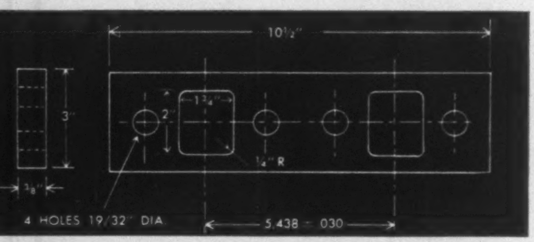
Look at these random examples and see how Ryerson Metalogics sparks real savings by continually searching for and suggesting new materials, methods and techniques.

The broadest experience anywhere combines with the widest range of stocks available to offer you unbiased recommendations on the best material for any job—be it steel, aluminum or plastics. Always the right metal-fabricating machine, too—for Ryerson is the nation's largest distributor.

Your Ryerson representative is "Metalogics-trained" to help you *value-analyze* selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

**The Ryerson science of giving optimum value for every purchasing dollar.*

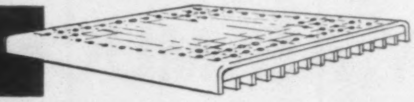
Saved: $100 per thousand



PROBLEM: Muffler manufacturer required accurately finished mounting plates made from ⅜" x 3" bar. Cutting bars to size, burning 1¾" x 2" holes and drilling four 19/32" holes proved time-consuming and expensive.

SOLUTION: Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100.00 per thousand pieces and quickly justified the small initial investment in dies.

Suggestion saves 85%



ASKED FOR: Customer wanted 1" hot rolled plate to cover about 80' of 24" open trench. Plate was to be cut into 24" x 27" segments—each containing 900 ⅜" holes to filter the product.

RECOMMENDED: After studying application and cost, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson experience and imagination saved 85% of the original cost.

Soft touch on fabricating sheets

THE NEED: Cold rolled sheets that would take severe forming and retain smooth, dull surface for high lacquer finish. Sheet quality was found on inspection to vary widely from one shipment to the next, causing variations in forming and finishing operations . . . high reject rate.

THE ANSWER: The Ryerson representative showed how our stringent quality controls would assure consistent quality on every shipment so that forming and finishing could be standardized for better results . . . lower production cost figures.

ACTION

Production upped 30%

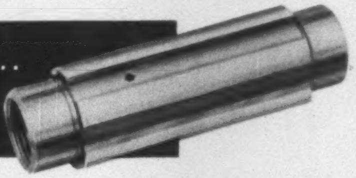
BEFORE: Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

AFTER: Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 s.f.m. and stepped up production 30%. Ryerson's stocks include the widest range of fast machining alloys—types and sizes to fit your every need.

PVC cuts costs 50%

OLD WAY: A screw machine shop used nylon in the manufacture of nipple adapter and coupling nuts—until a Ryerson representative came on the scene.

NEW WAY: At his suggestion, they changed to Ryertex-Omicron PVC—cut costs 50%. PVC machined better—to closer tolerances, with improved finish . . . ran faster without "gumming." Note exact cutting of threads and barbs. Threads fit perfectly.

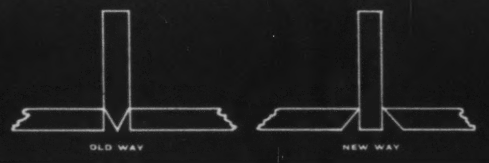


Deeper cut . . . better finish

SEARCH: Complicated machining of a carbide grade gear shaft included cuts up to ½″. It was discovered that required machining was too slow with the steel chosen for the job.

ANSWER: Rycut® 40 was recommended by the Ryerson representative. This free machining alloy fit the situation perfectly. The company found that Rycut 40 machined at 250 s.f.m., gave a better finish, increased tool life, and lowered total per-piece cost. An alloy in the Rycut series may well lower your costs.

New material, method and results



OLD: Rows of vertical aluminum grid members were attached to an aluminum base plate by notching the grid members and welding. (2024-T3 aluminum plate was used.) However, upon cooling, welds fractured—causing a high reject rate on this assembly.

NEW: A Ryerson representative suggested undercutting the base plate (as shown) instead of the grid members. This exposed a greater area to heat and permitted a larger deposit of weld material. Another Ryerson suggestion: change material to 5052-H34 aluminum, which responds better to welding operations.

Longer-wearing bearing

5-DAY LIFE: The sheaves that guide the enormous digging buckets of underwater dredges take a very severe load. Bronze bearing in the sheaves had to be replaced every four or five days.

5 MONTHS, SO FAR: After discussing the problem with a Ryerson man, the chief engineer decided to try a bearing made of Ryertex. The change was made, and five months later hardly any wear was noticeable! With its low friction coefficient, Ryertex is nonbinding, even on itself.

2 metalworking machines for the price of 1

A fabricator of stainless steel kitchen equipment was recently in the market for a new squaring shear. The one under consideration had a gap-type frame which would enable him to do an important notching operation—necessary for certain sink tops. After careful study, a Ryerson machinery specialist recommended *two* pieces of equipment instead of one at no increase in total cost. The first, an underdriven shear. The second, a universal-type sheet metalworking machine that would do the required notching, plus many other jobs—adding versatility to the entire operation.

PRODUCTS IN STOCK

STEEL—carbon, alloy, and stainless steel—bars, structurals, plates, sheets and strip, tubing, etc.

ALUMINUM—sheet (including new building sheet), plate, coils, rod and bar, tubing and pipe, building products, etc.

INDUSTRIAL PLASTICS—Ryertex-Omicron PVC in all forms. Also Ryertex® laminated phenolic plastics for bearings.

METALWORKING MACHINERY—the broadest line available from a single source for every kind of metal fabrication. Also specialized line of material handling equipment.

METALOGICS
RYERSON PLUS VALUES

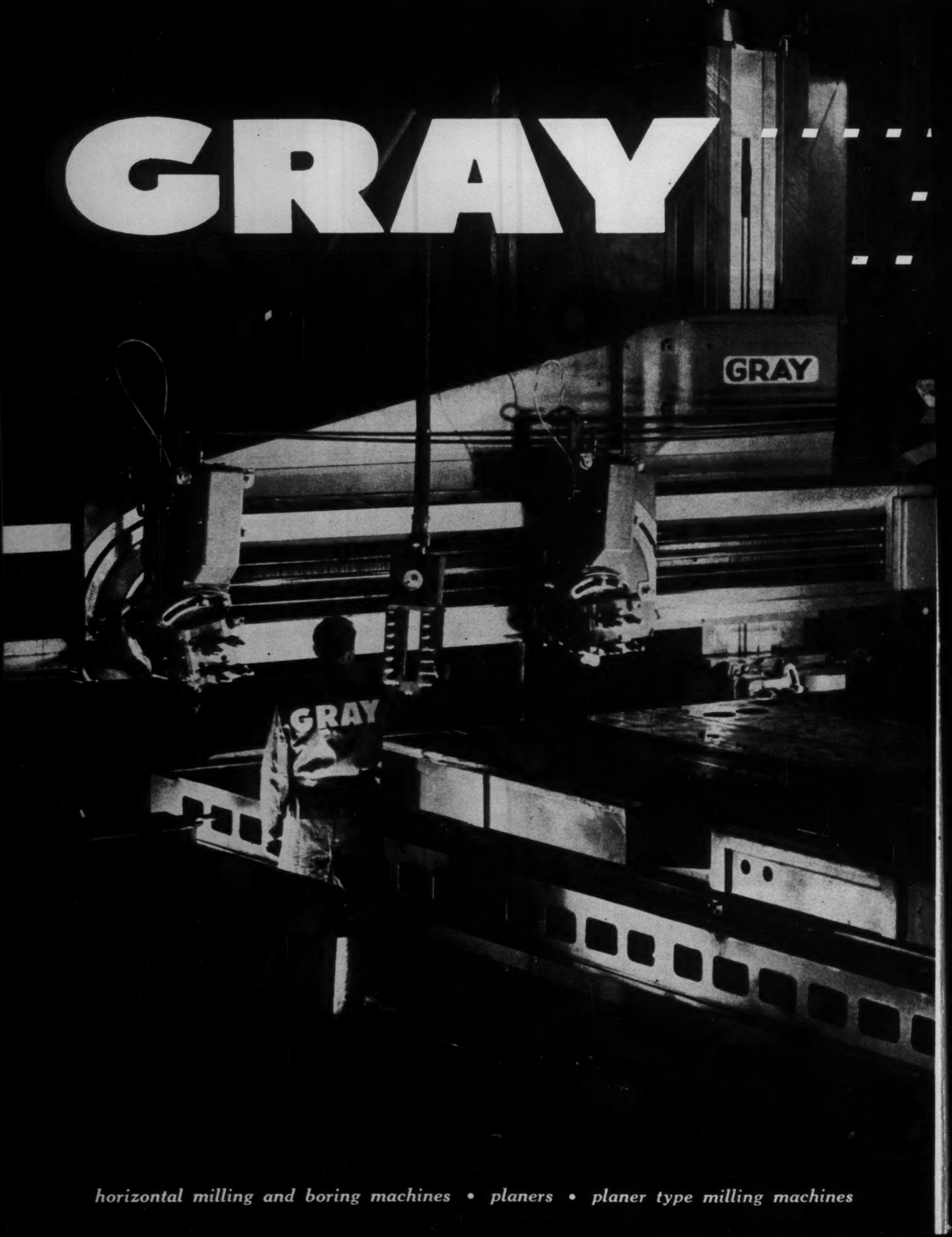
STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

CERTIFIED

RYERSON STEEL®

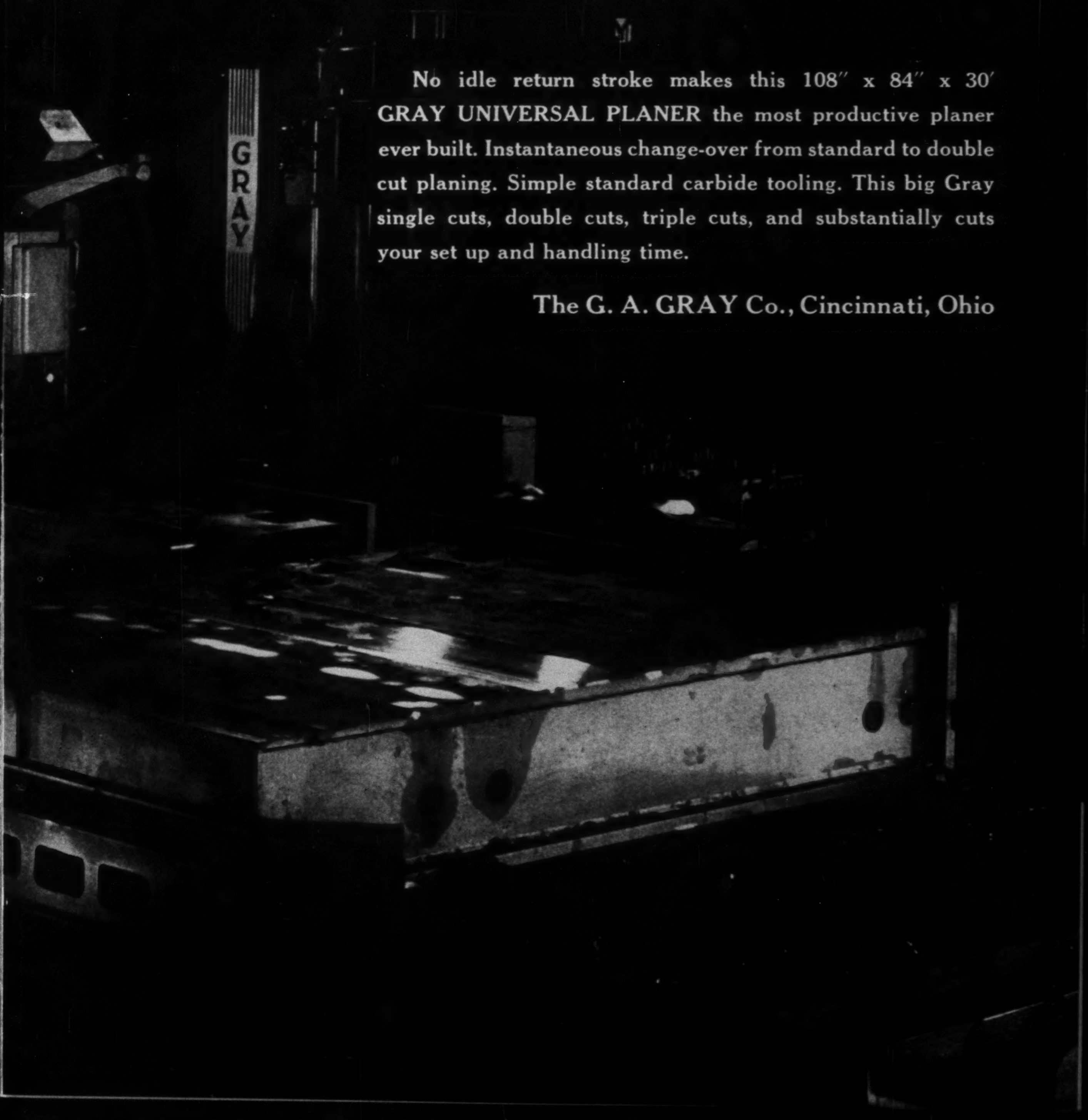
Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

SERVICE CENTER PLANTS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD



GRAY

horizontal milling and boring machines • planers • planer type milling machines



. . . cuts fast
. . . . . . cuts both ways
. . . . . cuts costs

No idle return stroke makes this 108″ x 84″ x 30′ GRAY UNIVERSAL PLANER the most productive planer ever built. Instantaneous change-over from standard to double cut planing. Simple standard carbide tooling. This big Gray single cuts, double cuts, triple cuts, and substantially cuts your set up and handling time.

The G. A. GRAY Co., Cincinnati, Ohio

Unique new use of special

In manufacturing, fragility and heavy maintenance costs are intolerable. That's why General Electric's F. W. Rueblinger investigated the replacement of milling cutters with diamond abrasive wheels in his arc-quencher finishing operation. As Manager of Manufacturing of G-E's Medium Voltage Switchgear Department, Philadelphia, he was dissatisfied with having to maintain a large inventory of cutters and to keep men working around the clock sharpening and replacing them.

Arc-quenchers are made of a hard and extremely abrasive asbestos compound. This presented such a problem that all but one of the abrasive people consulted threw in the sponge. The one who didn't was Bay State distributor Vince Flynn. He arranged for key General Electric production men to meet with Bay State's Research Staff in Westboro and the problem was examined from every possible angle.

Finally, after extensive development work, Bay State engineered a special 12″ diamond wheel that cut fast and maintained the extremely fine tolerances necessary in the finishing of these important parts of Metal-clad Switchgear.

With as many as 136 wheels on a single arbor simultaneously making ¼″ deep cuts, the problem of driving power alone could have been disastrously troublesome. However, the wheels Bay State developed cut so easily that it was possible to increase the feed rate nearly 400% . . . and overall productivity went up a good 50%!

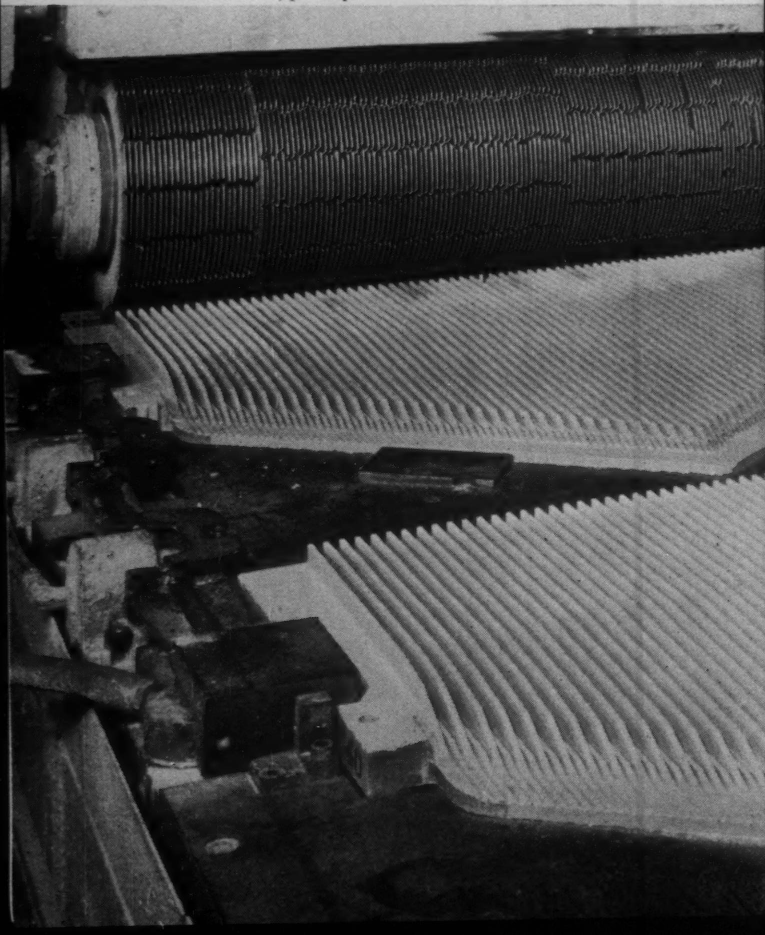
On top of these already proven advantages, wheel life is estimated at three full years so the constant down-time problems that used to arise from the need for cutter maintenance is entirely a thing of the past.

This outstanding success is not the end of the story. Now that General Electric's man-made diamonds are available for metal-bonded wheel applications, Bay State is engaged in intensive research into the even greater application potentials of this material.

Whether you have an unusually complex problem, or are simply trying to pare down costs, you'll find your Bay State distributor or direct representative is both hard-working and thoroughly experienced. *Better grinding at lower cost . . . that is his business.*

Right: Discussing the increased productivity that resulted from grinding, instead of cutting, hard asbestos-composition arc quenchers, are, left to right, Vincent J. Flynn, Bay State Distributor, F. W. Rueblinger, Manager-Manufacturing, John Stabb, Supervisor-Advanced Manufacturing-Engineering, and William A. Siter, Manager-Manufacturing-Engineering.

Below: Two arc-quenchers are shown immediately after passing under a tremendous array of 136 Bay State diamond wheels which have made simultaneous cuts ¼″ deep.



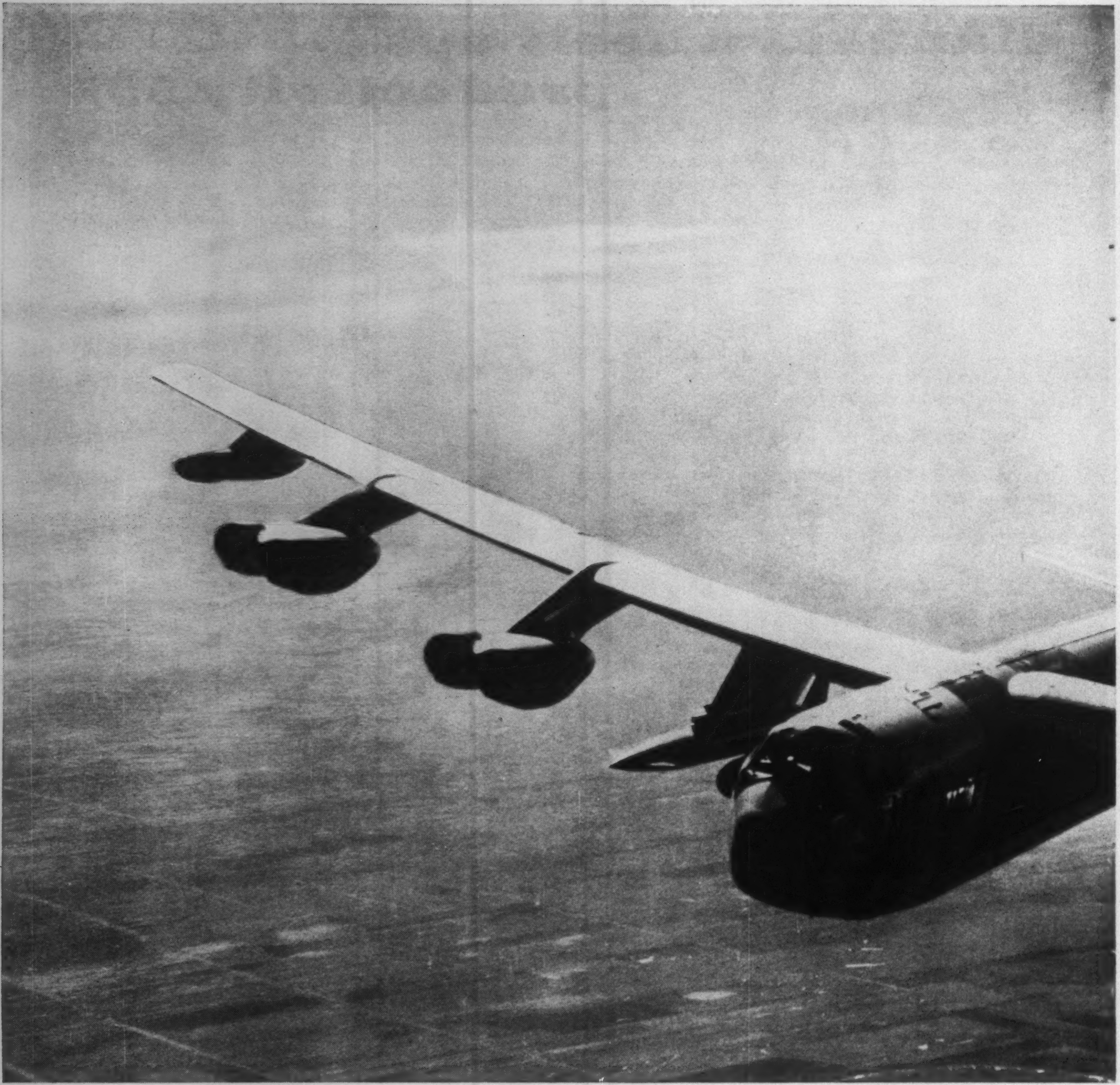
diamond wheels ups productivity 50%

Vincent J. Flynn was a Tool & Die Maker at the Frankford Arsenal when World War II came along and he joined the U.S.A.F. With this solid background in practical shopwork, he went into industrial distribution after the war, opening up his own business 5 years ago. Now a highly successful Bay State Distributor, he has this to say about Bay State: "They not only give me and my customers first-class service on routine problems . . . they also roll up their sleeves and dig in every time I come up with a puzzler . . . like this one, for example."

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.



The BOEING B-52G triple-threat nuclear bomber — a major weapon in the current SAC deterrent force—recently carried two big missiles over the North Pole on a 10,800-mile nonstop flight. The flight was another example of a successful effort by the SAC-industry team to provide constant refinement and maintenance of the Strategic Air Command's "big stick" fleet of heavy and medium jet bombers. Designed originally as a platform bomber, the B-52G can now carry, in addition to its bomb load, two North American "Hound Dog" GAM 77 missiles capable of tracking down targets hundreds of miles from their launching point. This makes it possible for the big ship to strike at three entirely separate targets in one raid. The B-52G transports a gross weight of nearly half a million pounds, and Alcoa® Extrusions help carry the load.

Now included in the main wing section are 75-ft extruded 7178-T6 Alcoa Aluminum alloy panels which make possible fuel storage in nearly the whole in-spar area (out to the external underwing fuel tanks). The external fuel tanks provide still additional range.

By shaving some 10,000 lb from the previous model, the B-52G range is increased by about 6 per cent . . . a weight saving accomplished mainly by a redesign of the wing structure. Boeing engineers greatly increased interior fuel storage, replaced fuel bags with an integral wing configuration.

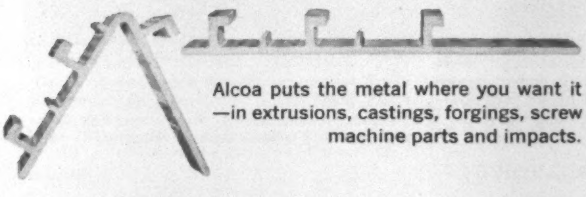
Alcoa Extrusions—in widths up to 35½ in.—are actually extruded for the B-52G in the "V" shape (pictured at right) on one of Alcoa's 14,000-ton extrusion presses. They are then cold rolled into the flattened cross section. The part is sent to Goodyear Aircraft Corporation, Litchfield Park, Ariz., for machining and assembling into a portion of the center wing section. Goodyear, in turn, ships the completed unit to Boeing Airplane Company, Wichita, Kan., for installation in the airplane. Extensive machining, riveting and assembly operations are eliminated by the use of these large extrusions—and the required strength is obtained with less weight than would be

HOW TO
CARRY
A
"BIG STICK"
10,800
MILES!

necessary if the wide section were built up from smaller pieces.

Mammoth presses are only a part of the story. Complex auxiliary equipment, including a 120-ft-long stretcher (with **3,000,000-lb** pulling force), roll straighteners and detwisters, enables Alcoa to extrude shapes that put the metal where it is wanted! With this extrusion equipment, Alcoa can produce closed-end containers up to 44 in. in diameter, stepped or other type extrusions up to 2,500 lb total weight, extrusions up to 39 in. in width, tubing of uniform or variable wall up to 19½ in. inside diameter. In addition to aircraft and other defense applications, large shapes extruded by Alcoa find uses in the electrical industry, pipelines, truck, bus, trailer, ship and architectural construction.

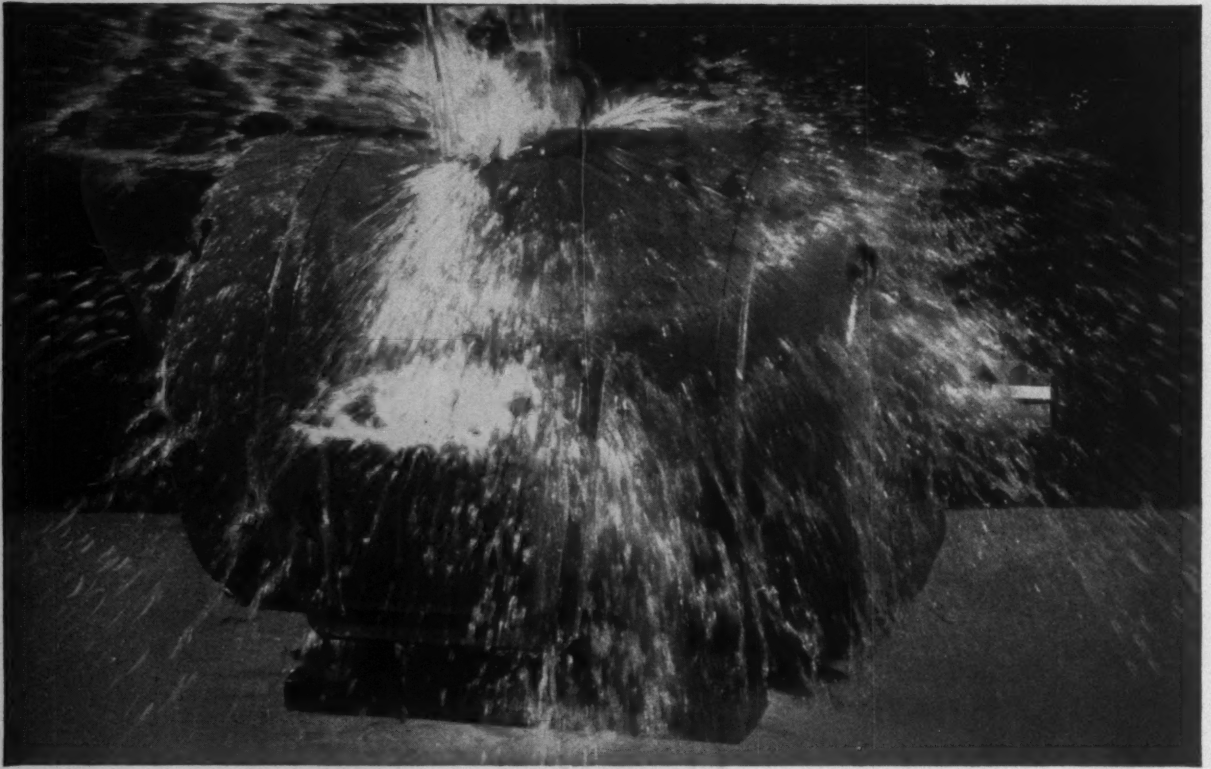
For more information, write Aluminum Company of America, **907-Y** Alcoa Bldg., Pittsburgh 19, Pa. World-wide sales through Alcoa International, Inc., 230 Park Avenue, New York 17, N.Y.



Alcoa puts the metal where you want it
—in extrusions, castings, forgings, screw
machine parts and impacts.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

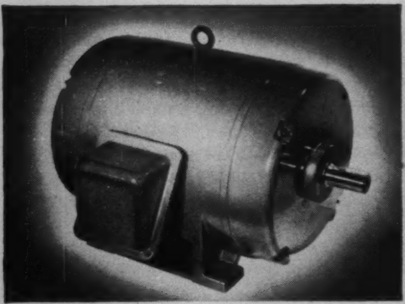


Sudden Splash or Soaking Shower

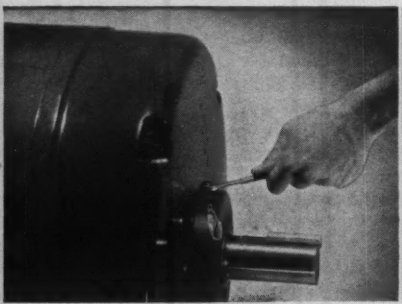
won't stop a Wagner® DP Motor . . .

Wagner® Type DP Motors are doubly protected by rugged, corrosion-resistant cast iron frames and dripproof enclosures. Splashing or falling liquids, corrosive acids, salts, and alkalies can't stop their smooth operation. Designed to meet a wide variety of applications—including many that used to require splashproof motors—Wagner Doubly Protected Motors pack plenty of power into precious little space, are lightweight, long-lived, and pare downtime and upkeep costs to the bone. Simply put . . . they get the job done. Let your nearby Wagner Sales Engineer show you how these motors can be applied to your needs. Call him, or write for Bulletin MU-223.

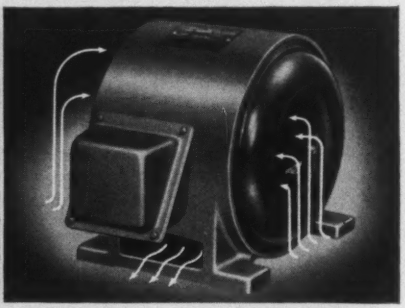
Wagner Electric Corporation
6403 PLYMOUTH AVE., ST. LOUIS 33, MISSOURI



SLEEVE BEARING MODELS AVAILABLE . . . DP Motors are built in NEMA frame sizes 182 through 445U; 1 through 125 hp—1750 RPM—40°C; available with ball bearing construction as illustrated or steel-backed, babbitt-lined sleeve bearings. Larger motors (Type RP) are available through 1000 hp.

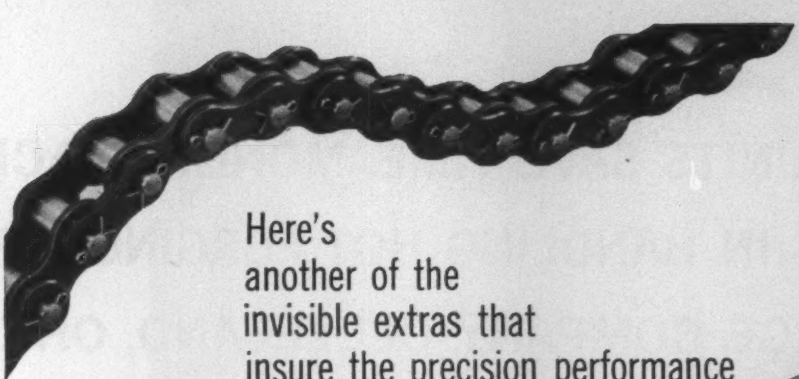


CAN BE RELUBRICATED . . . Original factory lubrication will last for many years in normal service, but openings are provided to permit the relubrication that adds years to motor life under severe conditions.

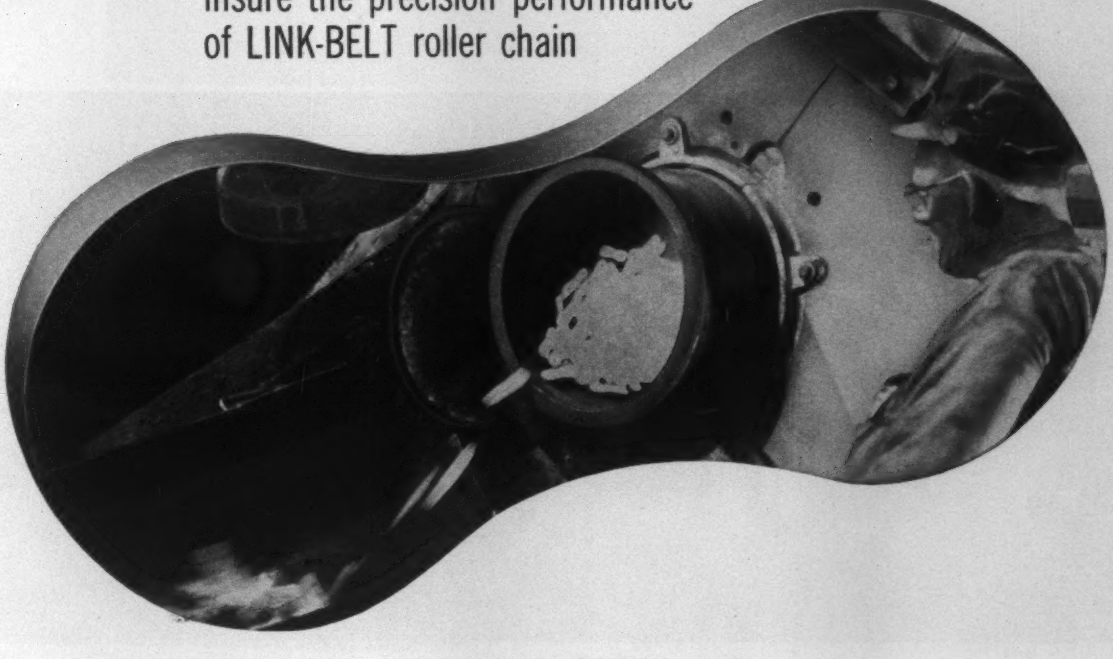


COOL RUNNING . . . Specially designed baffles direct cooling air through the motor to reduce stator temperature, thus increasing motor life. Blowers, cast as part of the rotor, move large volumes of air without noise or vibration.

WM60-20



Here's another of the invisible extras that insure the precision performance of LINK-BELT roller chain

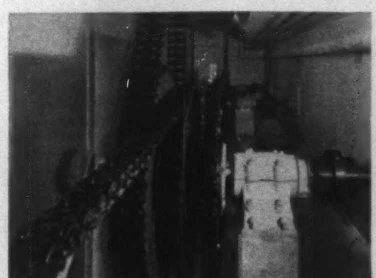


Painstaking precision of heat-treat control gives you

uniform strength in every link

To produce roller chain of utmost uniformity, Link-Belt maintains exacting control of all heat-treating processes. With equipment and instrumentation exactly tailored to the need, all processes are carefully adjusted to suit the characteristics of each heat and analysis of steel. Result: roller chain of uniform strength *well above accepted standards*. Chain that absorbs shock loads, delivers full power under continuous heavy going.

Precise heat-treat control is one of many *invisible extras* that contribute to the greater strength and endurance of Link-Belt roller chain. Others include prestressing, pitch-hole preparation, shot-peening. These features—plus painstaking precision and inspection in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high speeds.



Single and double strand Link-Belt roller chains combine to provide dependable, positive power transmission at this installation.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. Ask for Book 2657.

LINK-BELT
ROLLER CHAINS

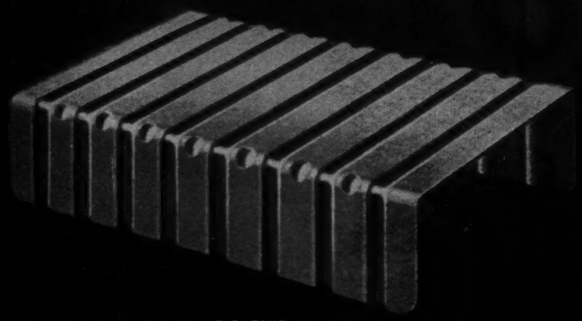
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

LINK-BELT

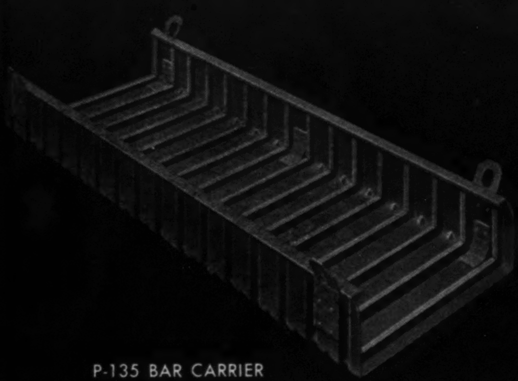
ROLLER CHAINS AND SPROCKETS

15,554

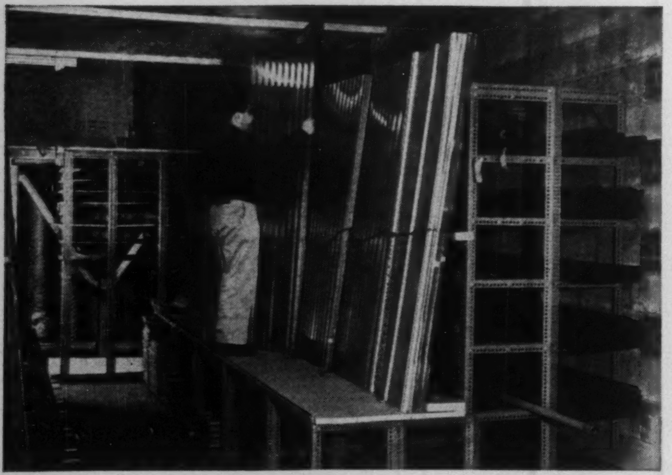
REPUBLIC SKID UNITS SAVE TIME, MONEY, SPACE IN HANDLING HOT FORGINGS AT PARK DROP FORGE COMPANY, CLEVELAND, OHIO



P-1 SKID

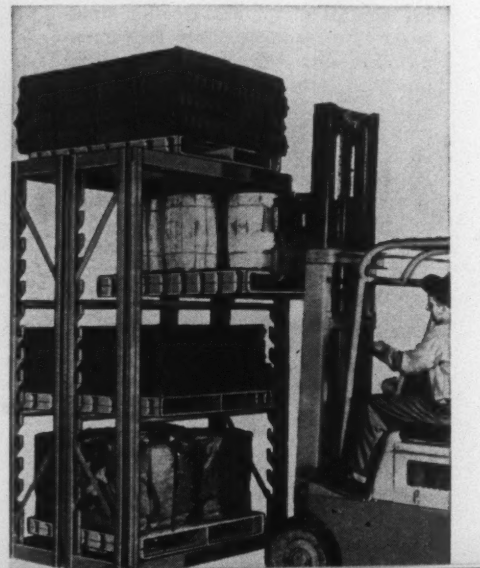


P-135 BAR CARRIER



REPUBLIC METAL LUMBER® solves framing problems fast! Simply measure, cut, and assemble with ordinary bolt and nut fasteners. It's the ideal material for constructing tailor-made storage facilities for hard-to-handle stock-and-store raw materials, industrial, and warehouse products. Available in two gages, two widths, in standard bundles of either 10- or 12-foot lengths. Order from your Republic-Berger warehouse. Send coupon for more information.

REPUBLIC PALLET RACKS simplify palletizing and stacking, save space. It is easy to stack and store bulky, uneven, odd-lot, and fragile materials. Tubular steel supports adjust every six inches to handle palletized material of any height. You can select pallets from any level. Two-way entry permits loading and unloading from either side. Send coupon for specifications.



PR-15 STACKING SKID

Republic Materials Handling Equipment is designed and built to handle heavy weights in heavy-duty service. Park Drop Forge Company, Cleveland, Ohio, pioneer in the forging industry, has been using Republic Skid Units for some time.

Forgings, still very hot, weighing up to 3,500 lbs., are placed two on a skid and stored in the yard for cooling before shipment. Nearly 7,000 lbs. of hot metal is punishment for any skid, but Republic Skid Units withstand this severe service year after year.

Republic Skid Units are made from highest quality steel and feature reinforced corrugated design for extra strength. Lifting lugs, stacking brackets, special fork entries, can be added for adapting basic Republic Skid Units to your particular operations.

Let Republic Materials Handling Engineers work with you in planning practical and economical ways of using basic Republic Units in solving materials handling and containerization problems. Call your Republic representative, or write direct.

REPUBLIC CAN DO IT FOR YOU with complete sheet steel fabrication facilities. Contract manufacturing is a full-time operation at Republic's Berger Division. Engineers work with you in developing your product, and in solving manufacturing, assembly, and delivery problems. Well rounded stock of tools, dies, and a complete machine shop. Modern production lines for shearing, punching, forming, and painting. To learn more about Republic-Berger contract facilities, call or write today.

SHEARING
PACKING AND SHIPPING
WELDING
PAINTING
ASSEMBLY
FORMING
PUNCHING

REPUBLIC STEEL

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. IA-9097-R
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send additional information on the following:

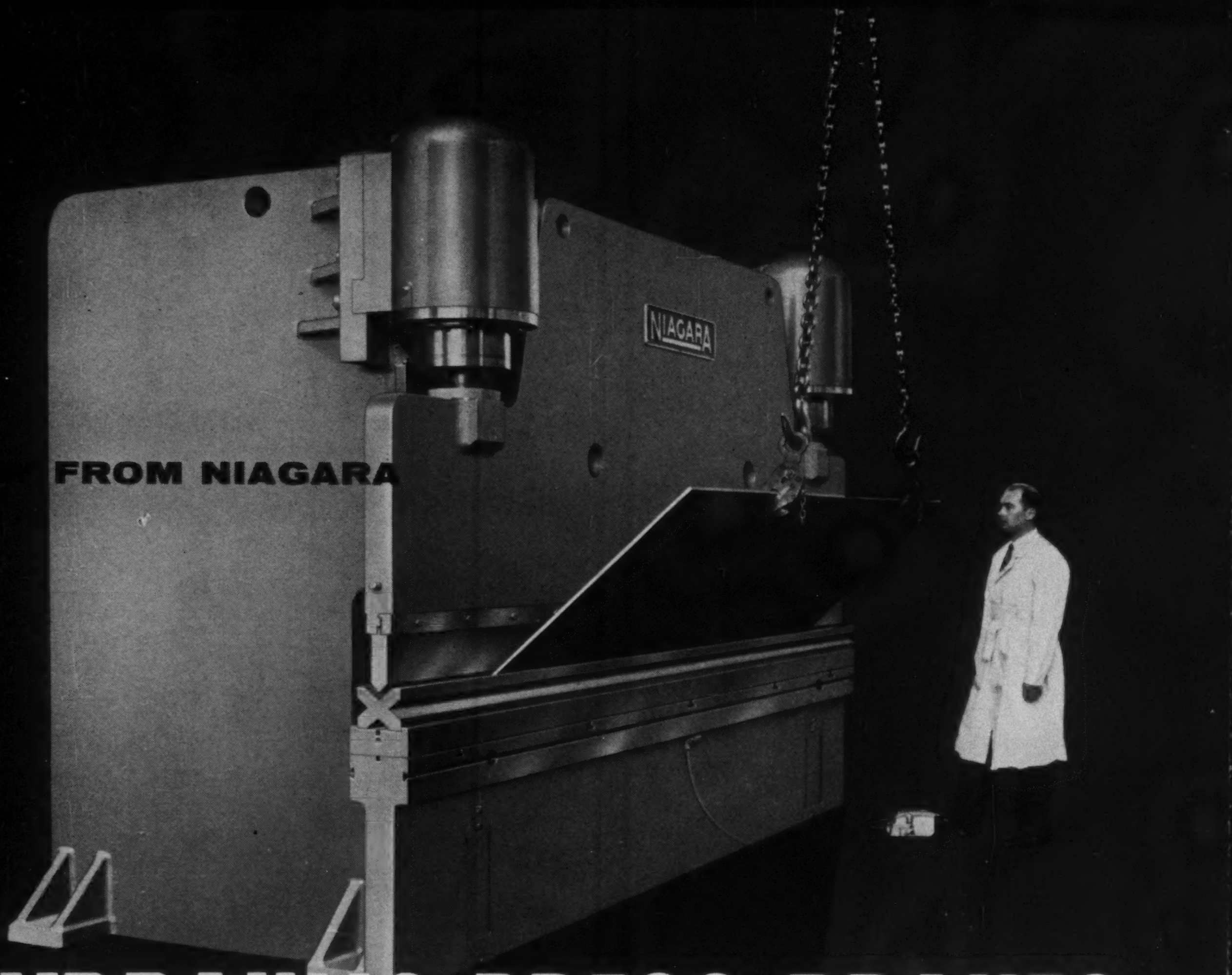
☐ Republic Materials Handling Engineering Service
☐ Republic Skid Units ☐ Pallet Racks
☐ Republic METAL LUMBER ☐ Contract Facilities

Name________________ Title__________

Firm____________________________

Address_________________________

City________________ Zone____ State________



FROM NIAGARA

HYDRAULIC PRESS BRAKES

44 MODELS OF SMOOTH-ACTION POWER!

. . . from 200 to 1000 ton capacities . . . up to 24 ft. working lengths

It was bound to happen: the development by Niagara of a companion line of hydraulic press brakes ... the best obtainable today.

Designed for long stroke work at constant tonnage, these all-new machines complement Niagara's long-established mechanical press brake series. Together, they cover a tremendous range of sizes and capacities *... the most complete in the industry!*

As in the development of Niagara's mechanical press brakes, nothing has been spared in designing the hydraulic HD Series. Features like these are the direct result.

- *UNITIZED HYDRAULIC SYSTEM*... compact and easily accessible
- *NEW RAM LEVELING AND TILT CONTROL* ... maintains accuracy *without* complex hydraulic or electronic devices
- *LAMINATED, NON-METALLIC WAYS*... prevent welding or galling of bearing surfaces
- *SELF-ALIGNING BALL JOINTS*... apply force uniformly to ram without binding
- *DEEP, RIGID BED*... interlocked to frame
- *FRONT-OPERATED, LOWER LIMIT RAM ADJUSTMENT*... with dial type counter for fast duplication of previous settings
- *ADJUSTABLE TOP AND BOTTOM STROKE STOPS*... conveniently located
- *TELL-TALE FILTERS*... guardian of the hydraulic system

But this only *begins* to tell the story. For complete facts and figures, request Bulletin 91.

Niagara Machine & Tool Works, General Offices and Works: 683 Northland Avenue, Buffalo 11, N. Y., U.S.A. District Offices and Distributors everywhere.

NIAGARA
HYDRAULIC PRESS BRAKES

NIAGARA

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

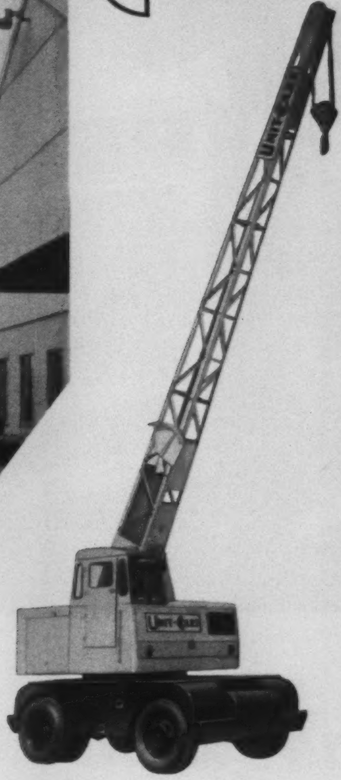
UNIT-COLES

WHAT MAKES **UNIT-COLES** BETTER THAN THE ORDINARY YARD CRANE?

IT'S THE ONLY CRANE WITH ALL MOTIONS ELECTRICALLY POWERED!

THERE'S NOTHING LIKE A UNIT-COLES MOBILE CRANE AND ITS UNIQUE GASOLINE-ELECTRIC OR DIESEL-ELECTRIC POWER PACK. LOAD-HOIST, SWING, BOOM-HOIST AND TRAVEL ARE **INDEPENDENTLY POWERED** BY SEPARATE ELECTRIC MOTORS WITH AN INFINITE RANGE OF SPEEDS. AT THE TOUCH OF A LEVER, THE OPERATOR RAISES OR LOWERS A LOAD QUICKLY, OR INCHES IT WITH PIN-POINT PRECISION.

THE MAN IN THE CAB FEELS SAFE AND SECURE, TOO, KNOWING THAT **THIS CRANE** WILL NOT LIFT AN UNSAFE LOAD, REGARDLESS OF LOAD RADIUS. UNIT-COLES' POSITIVE-ACTION SAFE LOAD INDICATOR AUTOMATICALLY PRE-WARNS HIM OF DANGEROUS LOAD CONDITIONS, THEN IMMEDIATELY "STOPS AND HOLDS" BOOM AND LOAD-HOIST MOTIONS IF WARNINGS ARE IGNORED.



other
UNIT-COLES
advantages include:

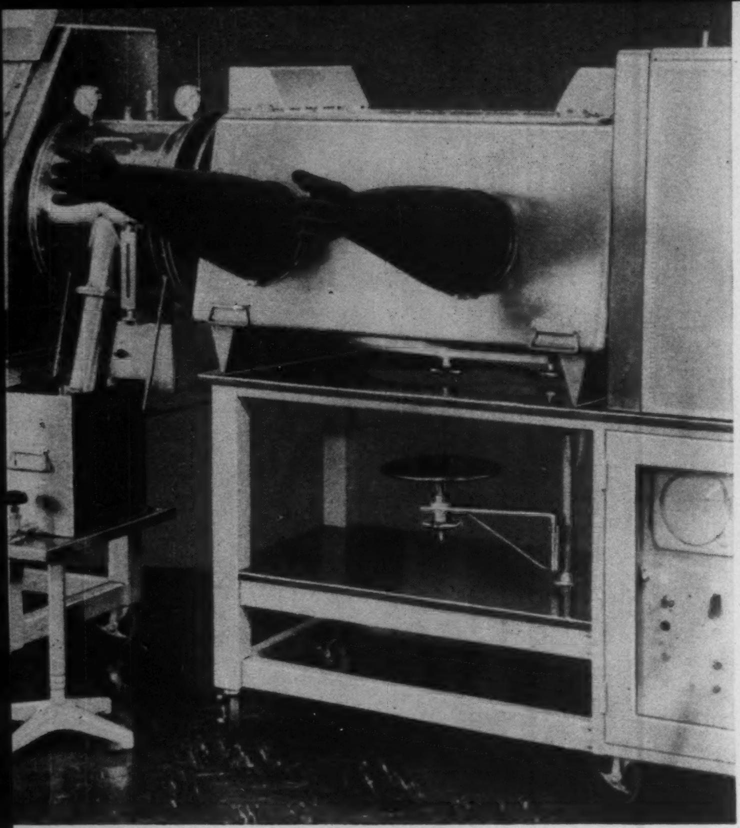
- "Dead-man control" devices that automatically return levers to neutral . . . "stop and hold" load in event of power interruption or accidental lever release.
- Fully automatic braking on all crane motions with "fail-safe" electro-mechanical brakes.
- Consistent "left-for-left" and "right-for-right" steering with cab in any position.
- No complex gear trains and clutches to maintain. Self-contained assemblies permit quick servicing, easy replacement.
- Shortest tail swing and turning radius of any American made fully-revolving crane.

UNIT-COLES Mobile Cranes have a heavy duty, self-propelled chassis and are available in capacities ranging from 5 to 55 tons. Write today for details on the complete line and the name of your nearest dealer.

UNIT

UNIT CRANE & SHOVEL CORP.

6705 W. Burnham Street
Milwaukee 19, Wisconsin



...CLEAN

When laboratory people talk of an "absolutely sterile environment" they mean just that. Only Stainless Steel can help make it that way. In this germ-free system, spot-welded Stainless Steel with molded silicone-rubber gaskets helps maintain a sterile environment for breeding germ-free animals. The apparatus is used to study infectious diseases, immunochemistry and cancer. Stainless Steel is easily cleaned because its smooth, pocket-free surface can't harbor contamination.

DIRTY...

Few things are dirtier than wet coal fines. And corrosive. The combination of moisture and sulfur eats away most materials in nothing flat. Not Stainless Steel. Stainless has exceptional corrosion resistance to anything that can happen in coal or ore processing. Screens, chutes and other handling equipment are easily fabricated from Stainless Steel. Stainless even has what they call "slideability"; its smooth surface prevents build-up and clogging. And it lasts up to 10 times longer than other materials.

USS **Stainless Steels ...**
no other metal makes
such a material
difference in
so many applications

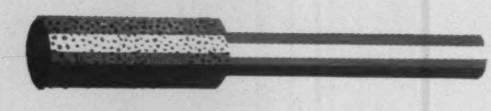
This mark tells you a product is made of modern, dependable Steel.

...and in between

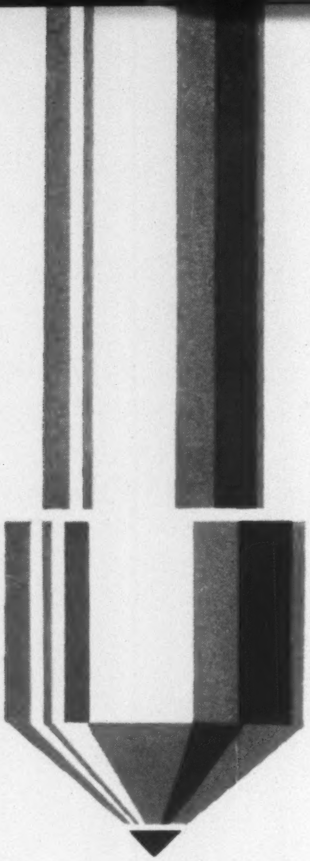
No material can match Stainless Steel's versatility. Stainless Steel offers designers and fabricators a unique combination of properties: superior strength, extraordinary corrosion resistance to an enormous variety of reagents, outstanding high temperature properties, and excellent appearance. It is easily fabricated and, because Stainless Steel lasts longer, actually costs less in the long run. If you have a selection or delivery problem, ask your USS representative or nearest steel service center.

USS is a registered trademark

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company
United States Steel



Diamond-impregnated tool



Truing tool

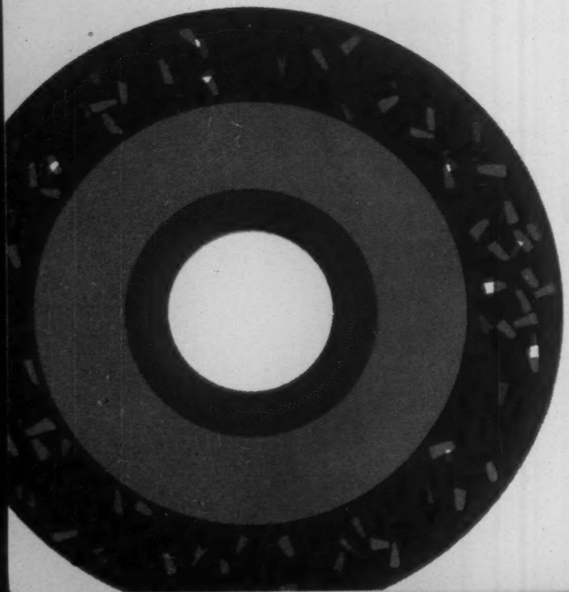
When you consider the job they do,

DIAMONDS CAN BE YOUR CHEAPEST CUTTING TOOLS

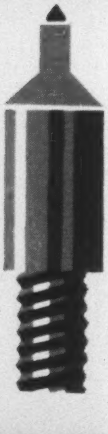
It's true that diamond tools may *seem* costly. But the real cost of any tool is the first cost divided by the work it does.

And diamonds usually work at higher speeds, do the job more quickly. Diamonds last longer, so tools don't have to be changed as often. Setups are reduced. Your people spend less of their time changing tools, more of their time operating machines.

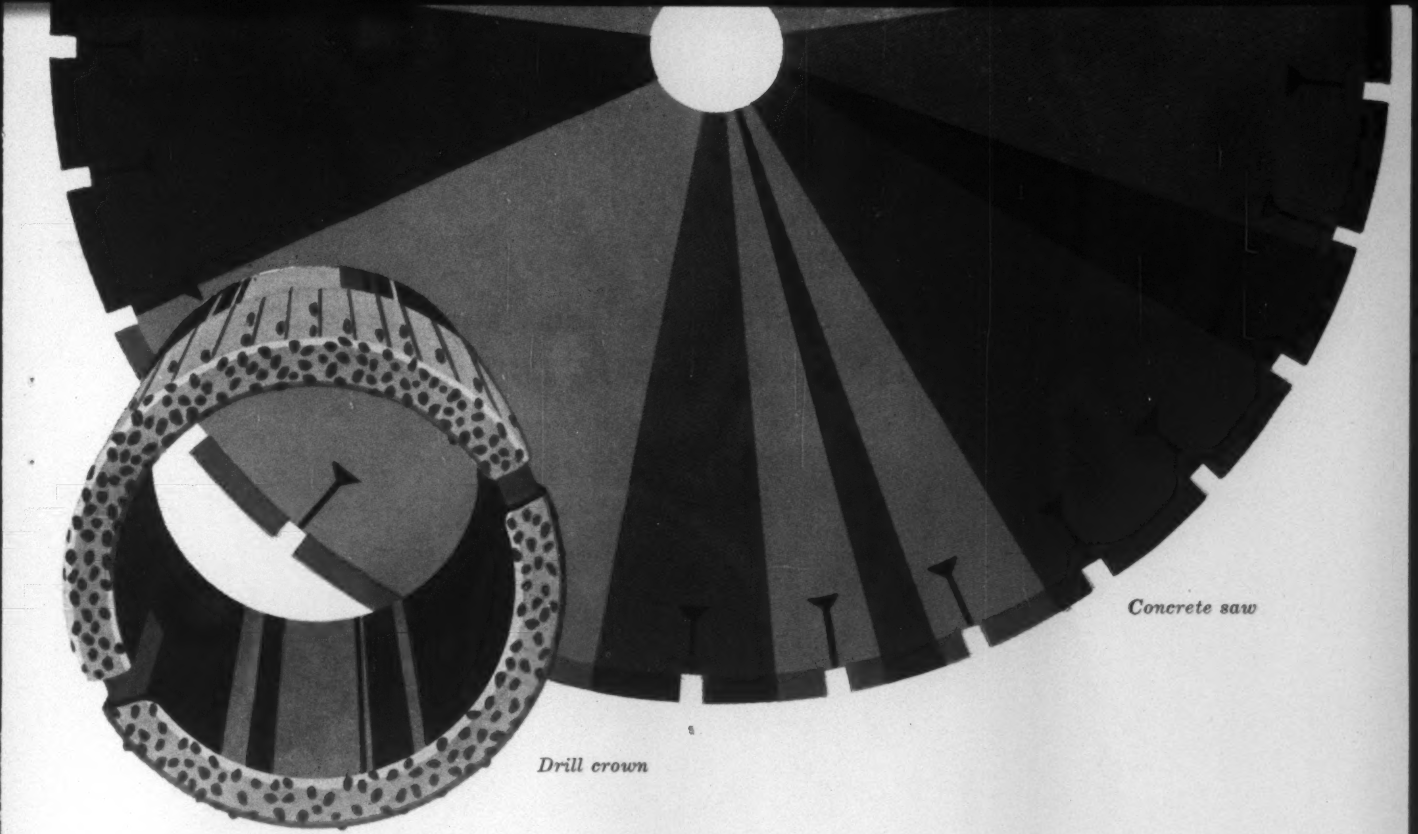
Engraving tool



Grinding wheel



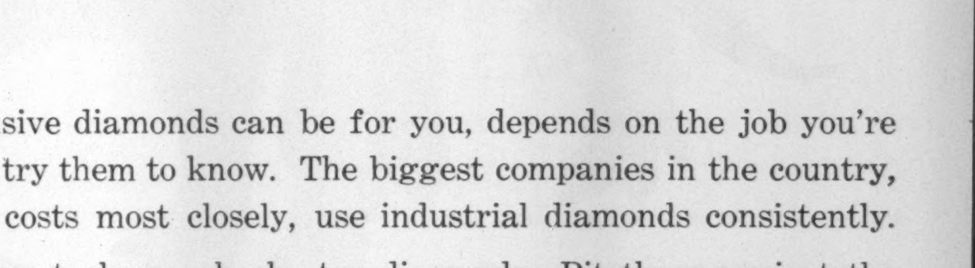
Centering drill



Just how inexpensive diamonds can be for you, depends on the job you're doing. You'll have to try them to know. The biggest companies in the country, the ones that watch costs most closely, use industrial diamonds consistently.

Next time you buy tools or wheels, try diamonds. Pit them against the cutting method you are now using. Chances are you'll find out how economical a diamond can be.

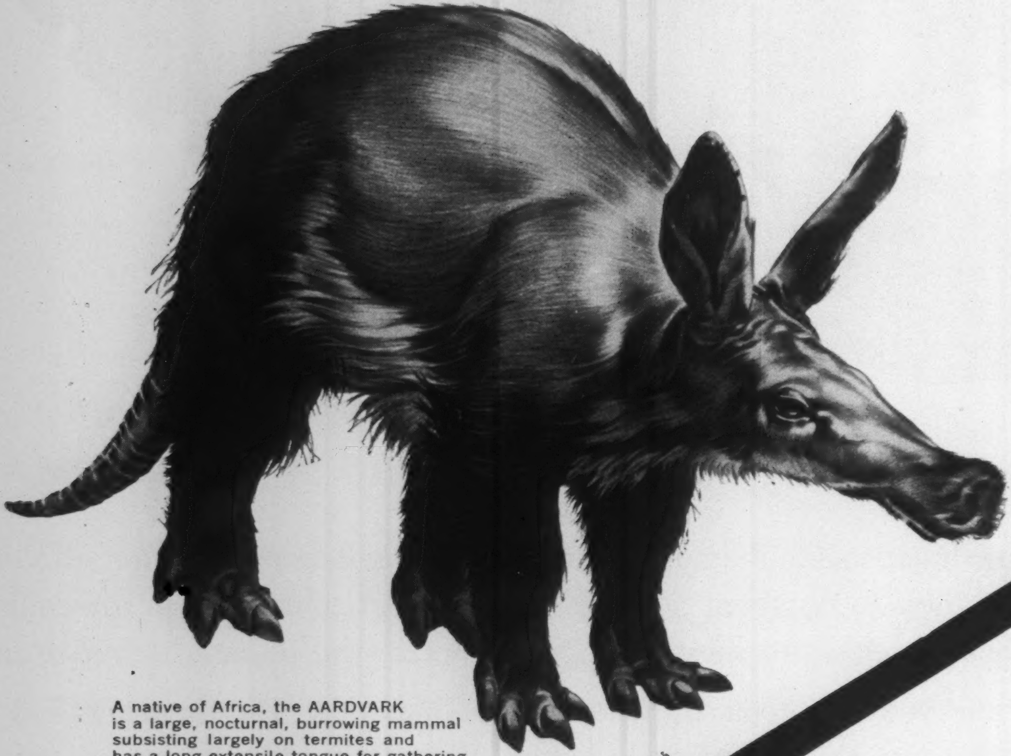
INDUSTRIAL DISTRIBUTORS (SALES), LTD., LONDON



INDUSTRIAL DIAMONDS CUT PRACTICALLY EVERYTHING . . . ESPECIALLY YOUR PRODUCTION COSTS

To learn how an Aardvark licks termites... call in a *ZOOLOGIST*

(specialist on animals)



A native of Africa, the AARDVARK is a large, nocturnal, burrowing mammal subsisting largely on termites and has a long extensile tongue for gathering them. He has heavy claws for ripping open rotten logs to find more termites.

To learn how to lick welding problems... call in *LINCOLN*

(specialists in arc welding)

A VIRGINIA manufacturer of underground gasoline storage tanks needed to cut his welding costs . . . his highly competitive industry being plagued with low profits.

Although they were already using the LINCOLN automatic submerged arc process, the LINCOLN Field Engineer was able to show this company how to eliminate 25% of their welding labor. He switched them to the new LINCOLN vapor shielded INNERSHIELD process.

Now the 4000-gallon tanks, fabricated from 3/16" steel, are welded at 90 inches per minute . . . with three men doing the job formerly done by four. Thus, reduced labor costs have substantially increased the profit margin.

In addition, when this manufacturer licks a rolling and fit-up bottleneck, the three weldors will be able to almost double their present output with no additional help.

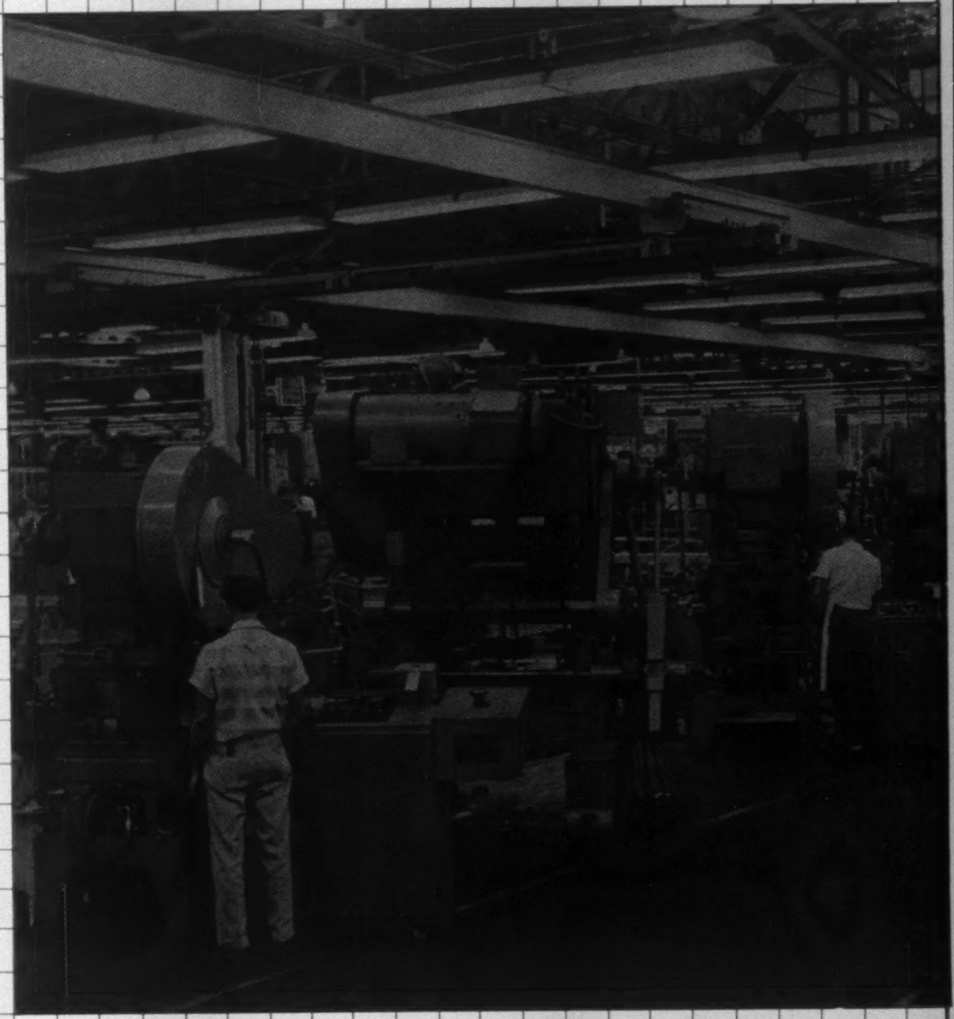
That's why we say it's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a "plus" at no charge.

THE LINCOLN ELECTRIC COMPANY
Dept. 1950 • Cleveland 17, Ohio

LINCOLN
WELDERS

This new Westinghouse BF relay . . .   saves inches here . . .

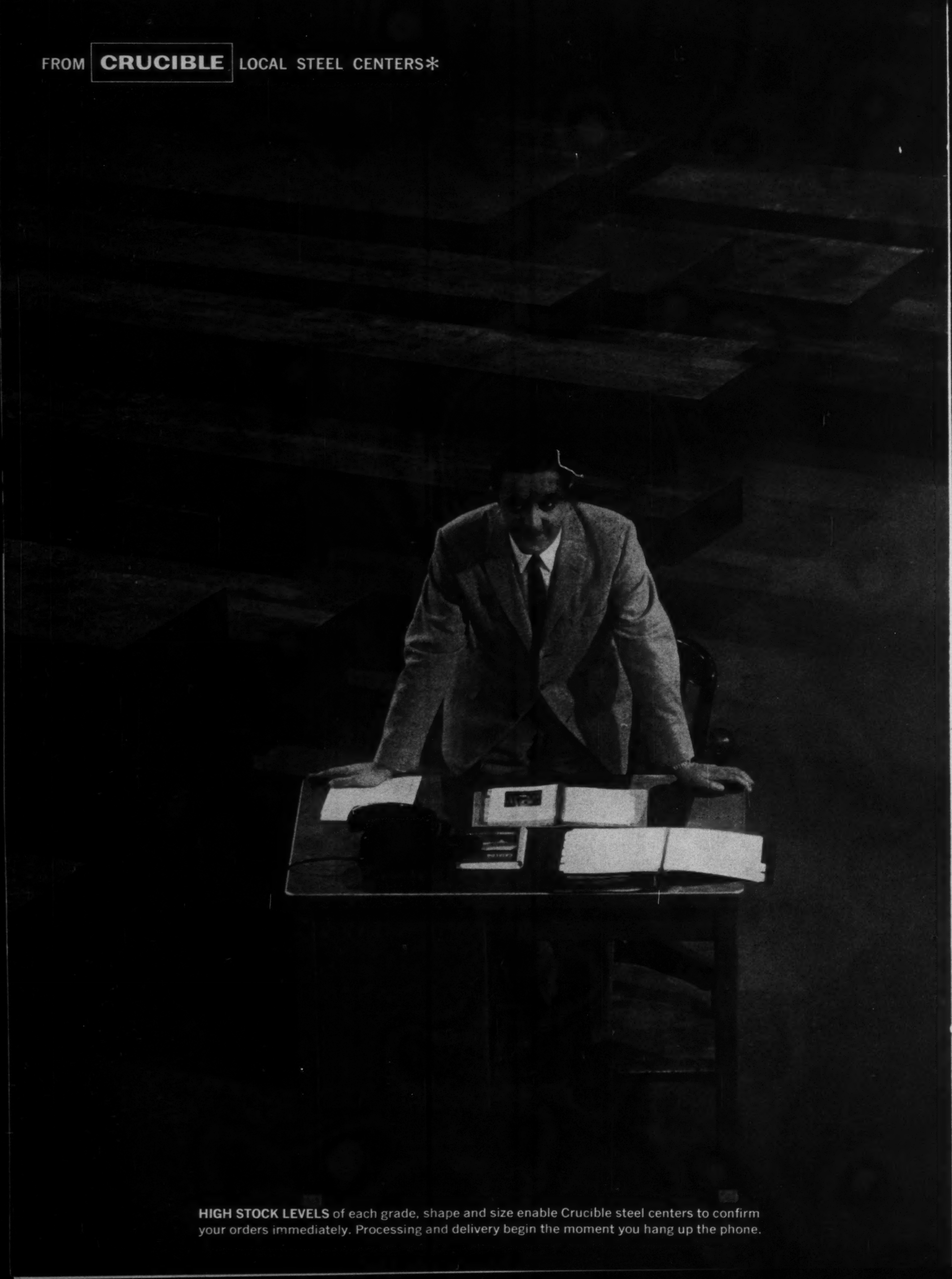
This new Westinghouse BF relay is small and can be butted one against the other so that your control panels can be reduced in size as much as 50%. Result: valuable plant floor space available for additional machines. Because the relay is specifically designed for automated machine tools, you cut installed costs more than 20%. And since this relay is in stock, you get these savings NOW.



feet here . . .

Want more information on the 6-amp, 300-volt BF and its companion, the 10-amp, 600-volt AF? Contact your nearest Westinghouse representative . . . or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa. J-30321-R

You can be sure... if it's **Westinghouse**



FROM **CRUCIBLE** LOCAL STEEL CENTERS*

HIGH STOCK LEVELS of each grade, shape and size enable Crucible steel centers to confirm your orders immediately. Processing and delivery begin the moment you hang up the phone.

16,000 ITEMS

Integrated Crucible steel centers stock 16,000 specialty steel items — keep each at a level that meets customers' maximum needs.

A wide range of specialty steel items continually flows from Crucible mills to local Crucible steel centers. So, each center keeps fully stocked with every item it offers.

This local availability of special steels (of all types, shapes and sizes) is a major reason why many steel users rely almost 100% on Crucible steel centers. As one buyer says: "We don't shop around for specialty steels. We use too many different items. We find we save by relying on a single source that can supply every item in the quantity we need. Apparently, only the Crucible steel center can do this."

Crucible steel centers offer a variety of services, too. Each center is staffed and equipped to handle your processing requirements. And each offers expert technical help with all kinds of metal-working problems. This assistance is possible because Crucible's entire operation is completely integrated — from steelmaking to local delivery to you. *Crucible Steel Company of America, Dept. PK06, Pittsburgh 30, Pennsylvania.*

MONTHLY STOCK LIST gives you up-to-date news on local stocks of specialty steels. Ask the Crucible salesman to put your name on the mailing list.

***FROM CRUCIBLE LOCAL STEEL CENTERS:** TOOL STEELS — Water, oil, air hardening, shock resisting, hot work, plastic and die casting steels in all forms, including bars, sheets, plates, drill rod, hollow bars, forgings and flat ground stocks • HIGH SPEED STEELS — Crucible's famous "Rex"® steels: Rex Thrift Finish rounds, hot rolled and cold drawn flats and squares, drill rod, forgings, sheets, plates, and tool bits • STAINLESS STEELS — Bars, sheet, strip, wire, cold heading wire, metalizing wire, plates, angles • FREE MACHINING STEELS — Crucible Max-el® rounds, hexagons, plates and brake die steel • ALLOY STEELS — Bars, billets, strip and sheet • COLD ROLLED CARBON SPRING STEELS • DRILL STEELS — Hollow and solid drill steels • ALUMINUM EXTRUSION DIE STEELS • HOLLOW TOOL STEEL • HARD FACING ROD • PLASTIC MOLD STEELS • PERMANENT MAGNETS • and many others.

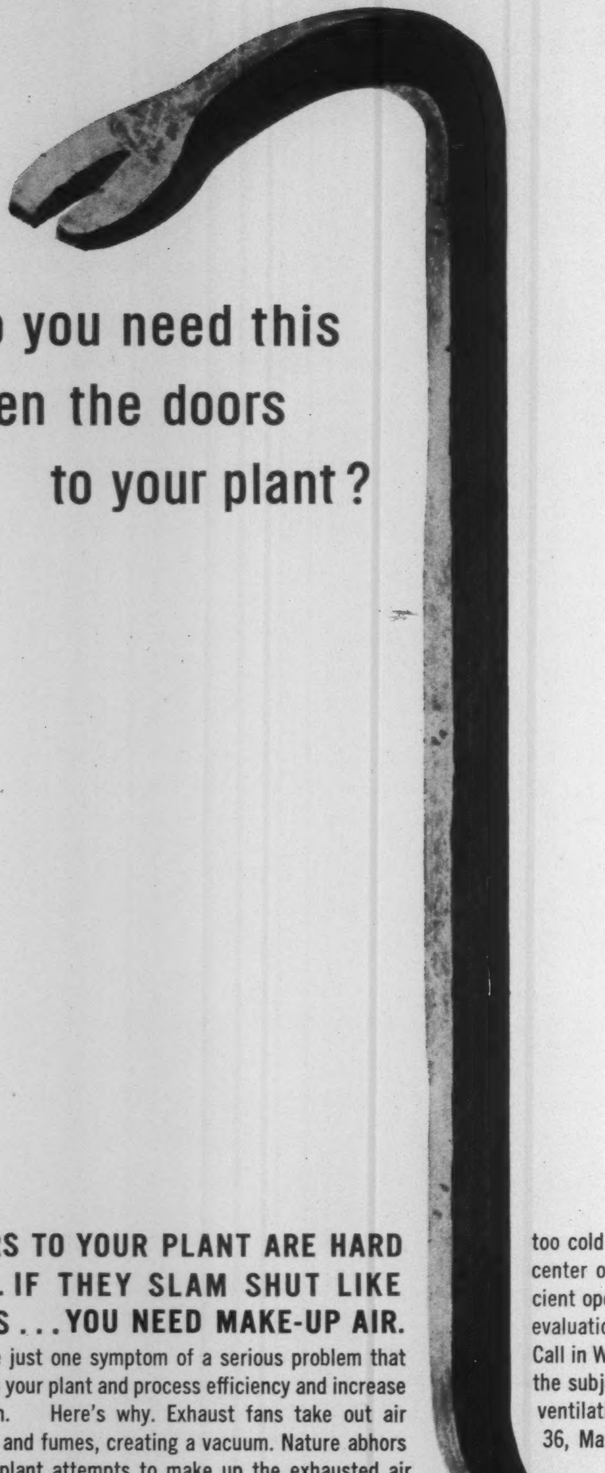
DETAILS OF YOUR REQUIREMENTS — all processing, shipping, and billing instructions — are kept up-to-date by inside account salesman assigned to your account.

REGULAR SHIPMENTS FROM CRUCIBLE MILLS replenish local steel center's stocks. If necessary, your Crucible center can borrow from others to fill out your order.

HIGHLY EFFICIENT INVENTORY SYSTEMS enable local steel centers to account for every item. So, each center can confirm local delivery while you're on the phone.

CRUCIBLE STEEL COMPANY OF AMERICA

BRANCH OFFICES AND STEEL CENTERS: Atlanta • Baltimore • Boston • Buffalo • Caldwell, N. J. • Charlotte • Chicago • Cincinnati • Cleveland • Columbus • Dallas • Dayton Denver • Detroit • Erie, Pa. • Grand Rapids • Houston • Indianapolis • Los Angeles • Miami • Milwaukee • Minneapolis • New Haven • New York • Philadelphia Pittsburgh • Portland, Ore. • Providence • Rockford • Salt Lake City • San Francisco • Seattle • Springfield, Mass. • St. Louis • E. Syracuse • Tampa • Toledo • Tulsa



Do you need this to open the doors to your plant?

IF THE DOORS TO YOUR PLANT ARE HARD TO OPEN . . . IF THEY SLAM SHUT LIKE STEEL TRAPS . . . YOU NEED MAKE-UP AIR.

Slamming doors are just one symptom of a serious problem that can raise havoc with your plant and process efficiency and increase worker absenteeism. Here's why. Exhaust fans take out air along with the dust and fumes, creating a vacuum. Nature abhors a vacuum, so your plant attempts to make up the exhausted air any way it can . . . through doors, around windows and through cracks in the walls. It never quite succeeds so a partial vacuum remains. What does all this mean to you? Combustion processes are starved for air. Your exhaust fans don't work efficiently. Workers are too cold near drafty outside walls and too hot in the center of the plant. These things mean costly, inefficient operation and high absenteeism. Want a free evaluation of your plant's present ventilation system? Call in Westinghouse application engineers, experts on the subject . . . or write for our booklet on **balanced** ventilation. Dept. K104, Sturtevant Division, Hyde Park 36, Mass. You can be sure . . . if it's Westinghouse.

Westinghouse

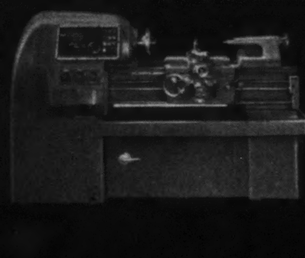
J-80704

EXCLUSIVE
COAXIAL
SPINDLE
DESIGN

new proven design

NēBEL MICRO-TURN*

HIGH-SPEED PRECISION LATHE



The entirely new Nebel MICRO-TURN Lathe combines the convenience of infinitely variable spindle speeds with the high efficiency of an exclusive new coaxial spindle. Designed around a single shaft surrounded by a planetary gear arrangement, the headstock provides outstanding structural benefits:

- **Low Inertia Effect for quicker acceleration and deceleration, prolonging clutch and brake life**
- **Simplified Alignment with fewer revolving parts for greater smoothness and efficiency of power transmission**

The MICRO-TURN Headstock is composed basically of two sections. The compact back gear unit provides high reduction in minimum space, operates only on low speed range and presents maximum power at the spindle for rated horsepower up to 400 RPM. Above 400 RPM, the coaxial spindle sections lock into a single unit, reducing vibration and insuring a high degree of finish.

For complete details, write today for your copy of the new MICRO-TURN Bulletin No. 219. Nebel Machine Tool Corporation, Lathe Division, 3415 Central Parkway, Cincinnati 25, Ohio.

*TM

lower
your
cost of
possession

2 Nickel Alloy Steels provide

A simple plan to save money by Steel Standardization

How many types of steel do you normally use?

Chances are you should examine your needs for alloy steel to see how many can be satisfied with just two types, 4340 through-hardening and 4620 carburizing.

You are likely to find that most of your engineering requirements can be met with confidence when you *standardize* on these two general-purpose steels.

You simplify inventory and materials-handling. You save money in purchasing and production, too.

- 4340 stands alone among medium-carbon steels in its ability to provide maximum strength, ductility, toughness and resistance to fatigue in parts of medium to heavy section.
- 4620 is a carburizing type that has consistently proved itself the ideal steel for a wide variety of carburized parts. 4620 is easy to carburize and has a minimum tendency toward distortion in heat treatment.

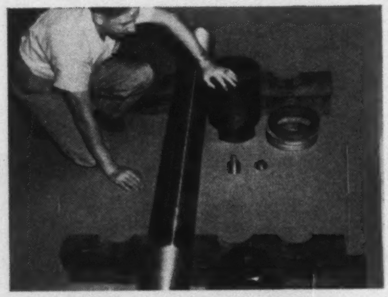
Available From Steel Service Centers
Both 4340 and 4620 are stocked by Steel Service Centers from coast to coast, ready for off-the-shelf delivery in a variety of sizes.

When you have carried your standardization plan as far as you can and you still have specialized needs to fill, the right nickel steels are available to give you extra performance or even lower costs.

For a buyer's guide to Steel Service Centers that stock 4340 and 4620, and other nickel-containing grades, simply write Inco.

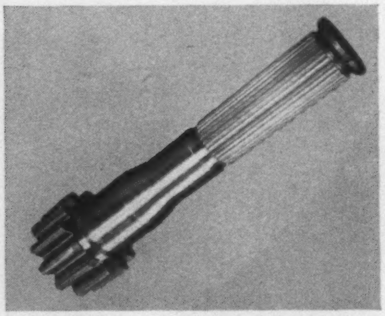
INCO
TRADE MARK
THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

STEEL
SERVICE CENTER
INSTITUTE

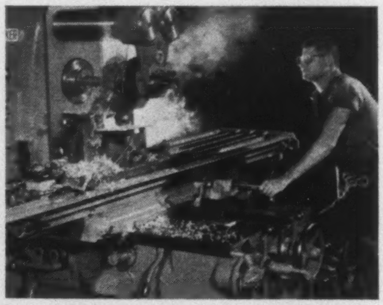


Holding the Shippingport nuclear reactor's top head to its shell section is a job performed by 42 studs of AISI 4340. This through-hardening nickel steel provides essential strength and toughness.

Power-packed tractor features unique drive mechanism composed of regular gear transmission, clutch and torque converter with lock-up, utilizes nickel alloy steels in more than 25 components.



Swing shaft for giant power shovel made from 4340 nickel alloy steel for strength and toughness to take shock-loading in stride. This 9″-diameter, 36″-long shaft of 4340 nickel alloy steel transmits tremendous torque to a giant ring gear.



Sustained accuracy is assured in this heavy-duty milling machine by spindle and gear components of AISI 4340 and 4620 nickel alloy steels. They provide needed strength and wear resistance.

GENERAL ELECTRIC

New high-temperature furnace for brazing alloy assemblies solved space and work handling problems for an aircraft engine manufacturer.

HEAT

from General Electric

How General Electric furnace innovation keeps pace with your product progress

Progress in the art of furnace design and manufacture can be vital to the future progress of your business. Recent innovations by General Electric promise tremendous savings to any industry which includes heat treating in its processes.

Example: Jet cooling, developed by General Electric, now permits increased furnace output and up to 30 percent reduction in floor space for annealing furnaces. New design gives faster cooling of light-gage strip.

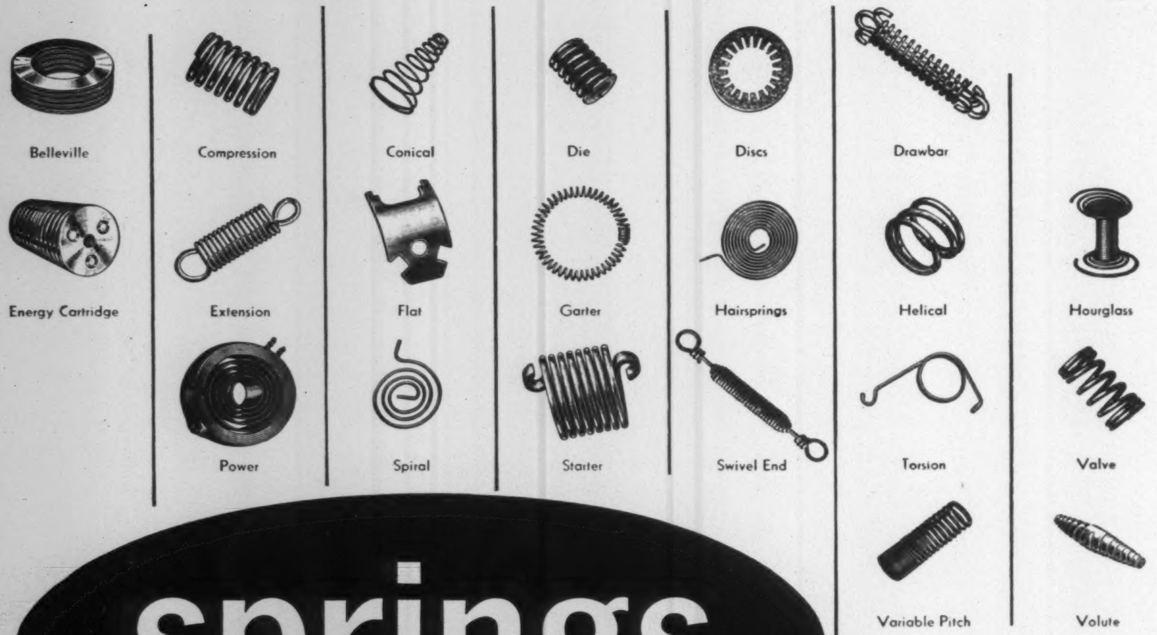
Example: A new muffle-less furnace for bright brazing of stainless steel has saved one customer $45,000 in a single year in muffle replacement costs and downtime.

Example: New General Electric radiation shield furnaces give faster heating and cooling cycles than hot retort furnaces. The new furnaces are used with vacuum, or inert or hydrogen atmospheres up to 4200 F.

Next time you're modernizing or adding to your heat treating line be sure to call your G-E Apparatus Sales Office. Take advantage of the "added value" engineering service that General Electric provides.

721-32

GENERAL ELECTRIC


Belleville
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Torsion
Valve
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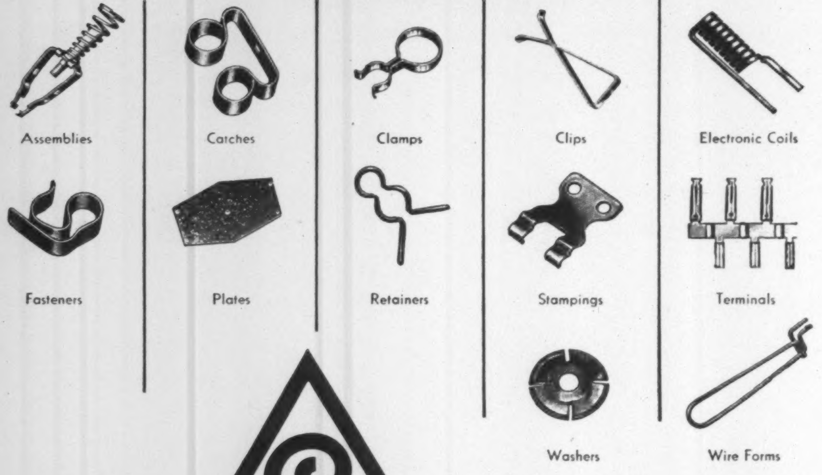
springs

and other things

custom-made to quality standards

Answer your "where to get it" questions– by calling on the versatile experience represented by these typical springs and stamped parts. Here is unusual ability to analyze your part from both design and production efficiency and to make cost-saving contributions where possible. Whether your requirements are large or small, routine or extreme precision, you'll get a better brand of service and quality from the best springmakers in the business.

Send for "Pocket Guide to Springs and Other Things" —a quick picture of our products and services.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Electronic Coils
Fasteners
Plates
Retainers
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Terminals
Washers
Wire Forms

6003

Associated Spring Corporation

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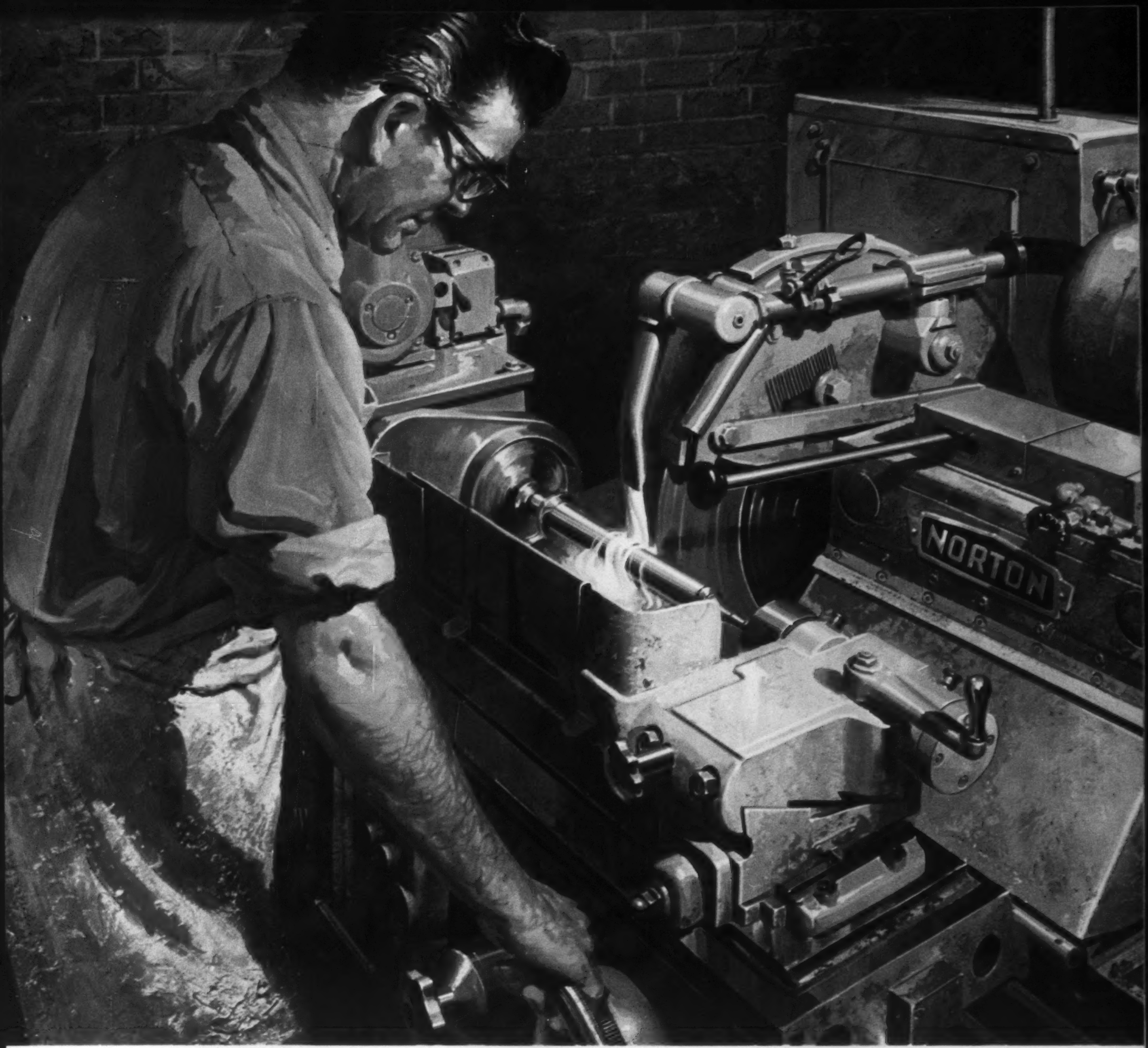


Adding the "Touch of Gold" all around

He's finishing a shaft with the two best tools — a Norton grinding wheel on a Norton cylindrical grinder.

In O.D. grinding as in every other type, choosing your wheels calls for just as much care as choosing your machines. New manufacturing techniques, combined with improved bonds, provide excellent structural uniformity and the best-balanced wheels in the industry. So, remember that Norton O.D. wheels are engineered to add the product-improving, cost-cutting "Touch of Gold" all the way 'round any cylindrical workpiece.

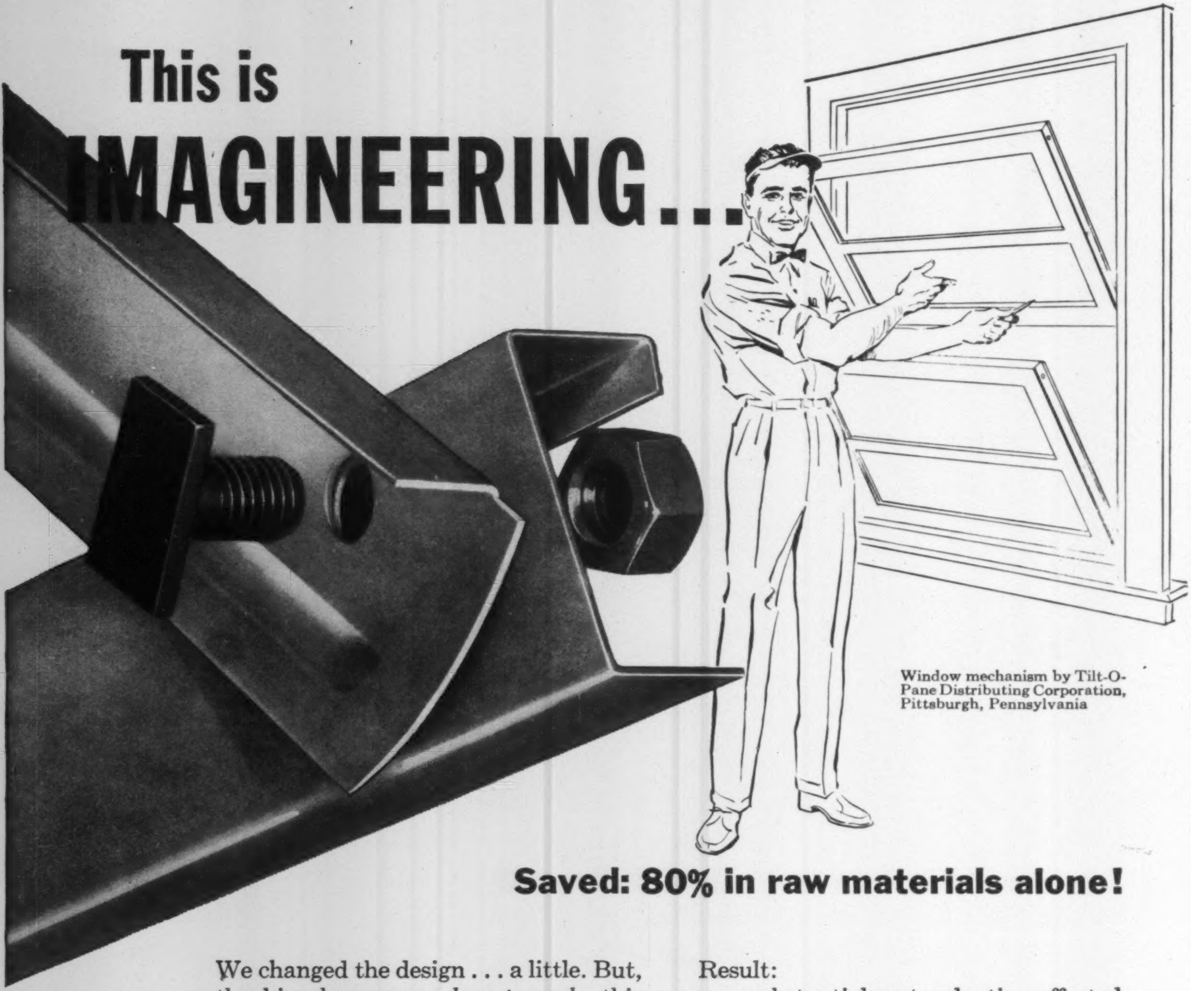
Get these "Touch of Gold" benefits working in your production. Your Norton man, a trained Abrasive Engineer or your Norton Distributor will be glad to tell you how. NORTON COMPANY, General Offices, Worcester 6, Massachusetts.

NORTON
ABRASIVES

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

This is IMAGINEERING...



Window mechanism by Tilt-O-Pane Distributing Corporation, Pittsburgh, Pennsylvania

Saved: 80% in raw materials alone!

We changed the design . . . a little. But, the big change was *how to make* this special T-head bolt for Tilt-O-Pane, the window with the hidden hinge.

Previously machined *from solid bar stock*, 80% of the bar became chips . . . scrap on the machine shop floor . . . and the shank and head often parted company during installation.

Screw and Bolt design engineers were able to "impact-form" this special bolt for Tilt-O-Pane from less expensive wire stock. (*other bolt makers said it couldn't be done*)

Result:

- substantial cost reduction effected
- raw material loss eliminated
- strength problem totally corrected
- window hinge reliability considerably improved
- product assembly simplified

and Screw and Bolt's *imagineering* cost nothing!

Imagination, coupled with engineering, can do the same for you. If you don't know where you can use Screw and Bolt's *imagineering*, it's already costing you money!

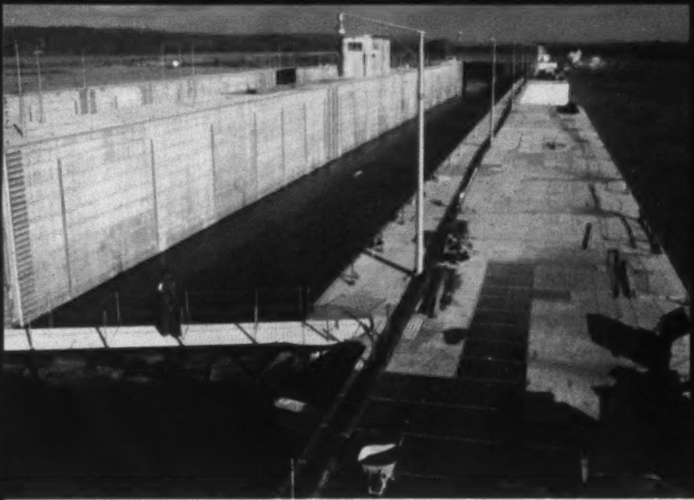
VMA 7619

SCREW AND BOLT CORPORATION OF AMERICA

P. O. Box 1708 • Pittsburgh 30, Pennsylvania

DIVISIONS: Pittsburgh • Gary • Southington Hardware • American Equipment

AMERICA'S MOST COMPLETE LINE OF INDUSTRIAL FASTENERS



"T-1" Steel saves 289 tons of weight in 16 lock gates

This is a story about how the tremendous strength of USS "T-1" Steel was utilized to save 289 tons of weight in the lock gates at the new Greenup, Kentucky and Markland, Indiana locks and dams on the Ohio River. Each lock gate has five diagonal braces that were designed for USS "T-1" Constructional Alloy Steel. At Greenup, it was estimated that 64 tons of "T-1" Steel did the work of 213 tons of carbon steel in eight gates. At Markland, 60 tons of "T-1" Steel were used instead of 200 tons of carbon steel to do the same job.

The diagonal units provide the supports which are absolutely essential to brace the gates. Each diagonal is a flat bar 8 inches wide by 1½ inches thick and about 73 feet long and weighs around 3,200 pounds. Toward the center of the diagonal is a turnbuckle used to adjust tension. By using USS "T-1" Steel, which has a minimum yield strength of 100,000 psi, both the size and weight of the diagonals were greatly reduced while retaining an ample factor of safety.

Lower costs. Reduction in weight because of the use of USS "T-1" Steel meant lower overall material costs, reduced shipping costs by more than one third, and decreased handling and erection costs.

USS "T-1" Steel for hoists. Four hoists for the emergency gates at Greenup locks and dam were also built of USS "T-1" Steel by McNally Pittsburg Mfg. Co., Pittsburg, Kansas. The structures are girder sections about 25 feet long and 41 inches deep. Flanges are 20 inches wide by 2½ inches thick. The webs are 36 inches deep by 1¼ inches thick. All were fabricated from "T-1" Steel plates. Each girder weighs about 12,000 pounds.

The new locks and dam on the Ohio River at Greenup, Kentucky were built under supervision of Huntington, W. Va. District, U. S. Army Corps of Engineers. A similar set of locks at Markland, Indiana was built under the Louisville District, U. S. Army Corps of Engineers. Gates fabricated by Nashville Bridge Company.

Other uses of USS "T-1" Steel in construction. Wherever great strength is needed with least weight, such as in bridges, TV towers, pressure vessels, and high pressure penstocks, USS "T-1" Steel offers many advantages. And for big construction machinery, "T-1" Steel is unsurpassed because of its strength, high resistance to impact abrasion, and weldability. For complete information, write for our "T-1" book. United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

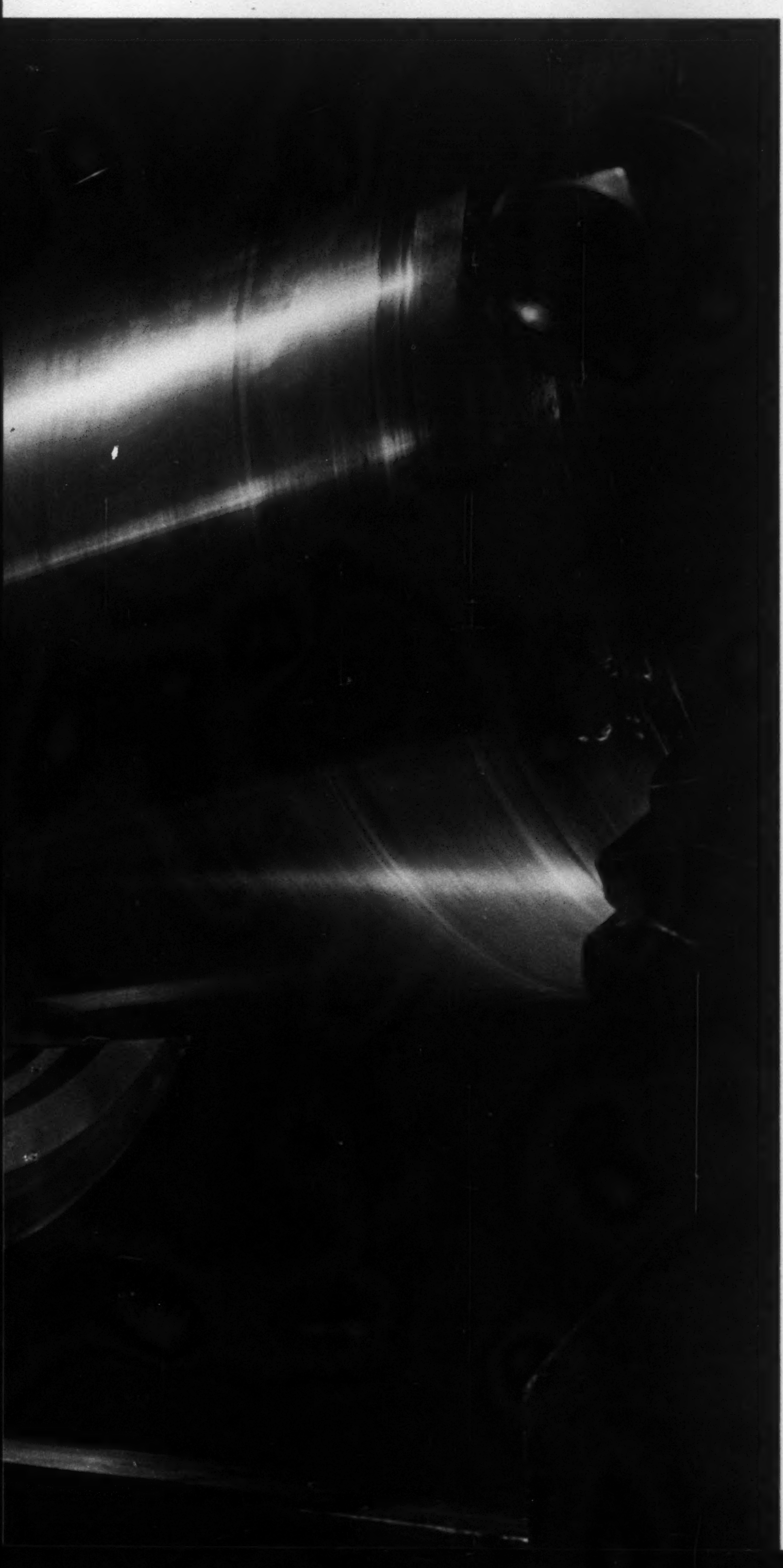
USS and "T-1" are registered trademarks

This mark tells you a product is made of modern, dependable Steel.

United States Steel Corporation – Pittsburgh
Columbia-Geneva Steel – San Francisco
National Tube – Pittsburgh
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
United States Steel Export Company
United States Steel

Down go back-up roll costs with

USS Quality Forged Sleeves



PICTURED ABOVE is James S. Rennick, a metallurgist with twenty years' experience in the Forgings Division of U. S. Steel. Jim specifies composition, heat treatment, and other processing procedures essential to the production of assemblies as shown in the main picture—a back-up roll that will be used in the cold reduction tin mill at U. S. Steel's Gary, Indiana plant.

This job points up a curious situation: U. S. Steel is one of the country's leading manufacturers of rolls, and also one of the biggest *users* of rolls . . . a double reason to perfect their performance and reduce their cost . . . just as we did here.

We had to replace a worn, cast steel back-up roll. Rather than replace the entire roll, we machined the face of the roll and shrunk on a *forged* steel sleeve. For back-up rolls like this one, 42" O.D. and larger, this method of sleeving is much less expensive than buying a complete new roll. One arbor can be used for several forged sleeves. A forged sleeve has a hard, wear-resistant surface and is highly resistant to spalling.

Also, the sleeve is purposely produced with a softer bore to develop a desirable stress pattern, and to provide maximum gripping between the arbor and sleeve after assembly.

There is a good possibility that we can help reduce *your* roll costs. Write or call the United States Steel Office nearest you, or United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Export Company

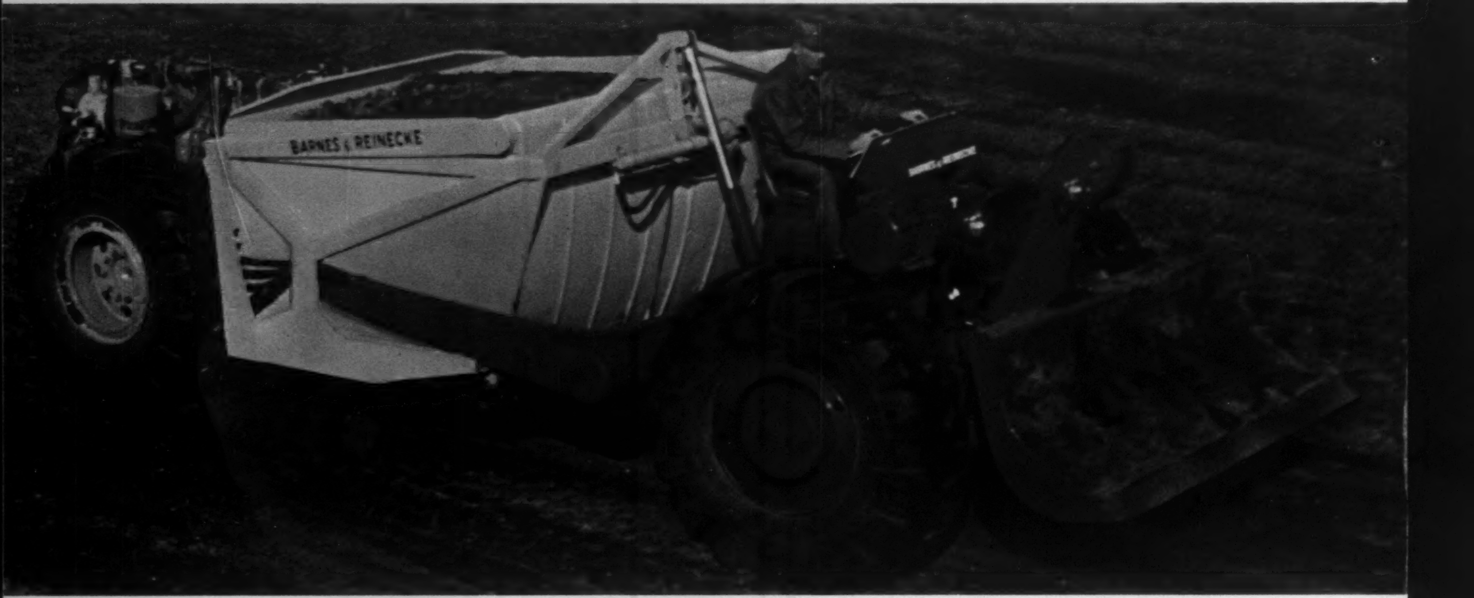
United States Steel

USS

Universal Engineer Tractor

(Steel bulldozer that flies)

"What we want is an earthmover that can do the work of conventional scrapers, dozers, and tractors . . . but which weighs only half as much . . . can be parachuted into a combat area, or flown in by helicopter!"



Army ballastable all-purpose tractor, manufactured for Barnes & Reinecke, Inc., by Hendrickson Manufacturing Company, Lyons, Illinois, is built light enough to be transported by air through the use of USS MAN-TEN High-Strength Steel and USS "T-1" Constructional Alloy Steel.

That was the demand made of the U. S. Army Engineer Center, Ft. Belvoir, Va. It was fulfilled through ingenious design using welded USS MAN-TEN High-Strength Steel and super-strength USS "T-1" Constructional Alloy Steel.

The ballastable all-purpose tractor weighs approximately 16,000 lbs. empty; 32,000 lbs. loaded. The weight reduction problem was solved by designers from Barnes & Reinecke, Inc., Chicago engineers. They designed the tractor in three sections—front end, scraper bowl and rear end.

The scraper's yoke, bowl frame, apron ejector, bowl skin and drawbar were welded from 3,370 pounds of "T-1" Steel, which has a minimum yield strength of 100,000 psi. Maximum working stresses on these parts were designed to 60,000 psi, more than triple the working stress that would be used with carbon steel. This permitted maximum weight reduction while retaining strength.

By using USS MAN-TEN High-Strength Steel in the dozer blade and rear-axle housing, they obtained the necessary strength with a reduction in plate thickness from the usual ½″ and 1″ down to ⅛″ and ¼″. USS MAN-TEN steel parts totaling 1,350 pounds were designed to a maximum weight reduction while retaining strength.

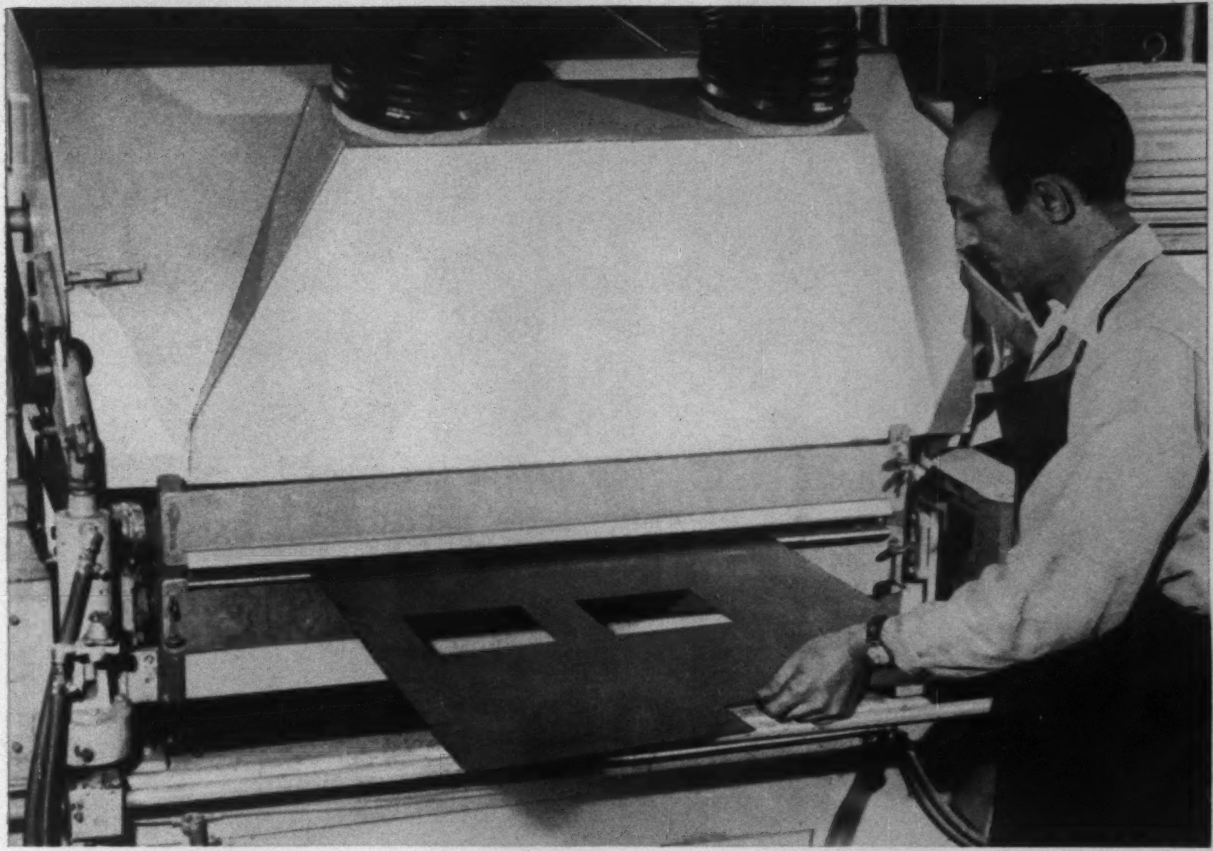
The machine shown, a feasibility prototype weighing 8 tons, will be superseded by a 10½-ton production unit powered by a diesel engine instead of an aircraft-type engine. This new item is designed to be conventionally transported by air, and it can be air dropped.

For other military vehicles, United States Steel makes extremely tough, rolled alloy steel armor plate in addition to a complete line of high-strength steels, stainless steels and carbon steels. For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS, MAN-TEN and "T-1" are registered trademarks

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
National Tube—Pittsburgh
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company
United States Steel

USS



3M Abrasives Help AMF Reduce Sheet Metal Deburring Costs

Innumerable ferrous and non-ferrous sheet metal components are manufactured for cigarette, cigar, bakery, and Automatic Pinspotter Machines at the American Machine & Foundry's Brooklyn, New York plant. Sheared to size and punched, components must then be deburred and cleaned prior to painting and plating. The previous method, using abrasive discs, often left swirl marks which had to be removed in a secondary hand sanding operation at extra cost.

As the result of a recommendation from a 3M Representative, AMF switched to the use of a wide-belt sander and "Three-M-ite" Resinbond Cloth Belts on these operations.

The results were remarkable. The new wide-belt prefinishing method eliminated all extra re-work, provided a better pre-paint surface, and cut unit costs substantially. Unit production time was slashed from more than 9 minutes to less than 30 seconds.

Why not let 3M's new Cost Check 5-4-5 Program help you to effectively investigate ways to lower costs and increase profits. Discover . . .

- If your grinding can be done more economically
- If your finishing is as efficient as possible
- If your polishing can be done faster and better

Send today for a free Cost Check 5-4-5 Review Form *without obligation.* Put 3M's years of abrasive know-how at your disposal.

3M Coated Abrasives

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COST CHECK
5-4-5

Send me my Free Cost Check 5-4-5 Kit

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MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

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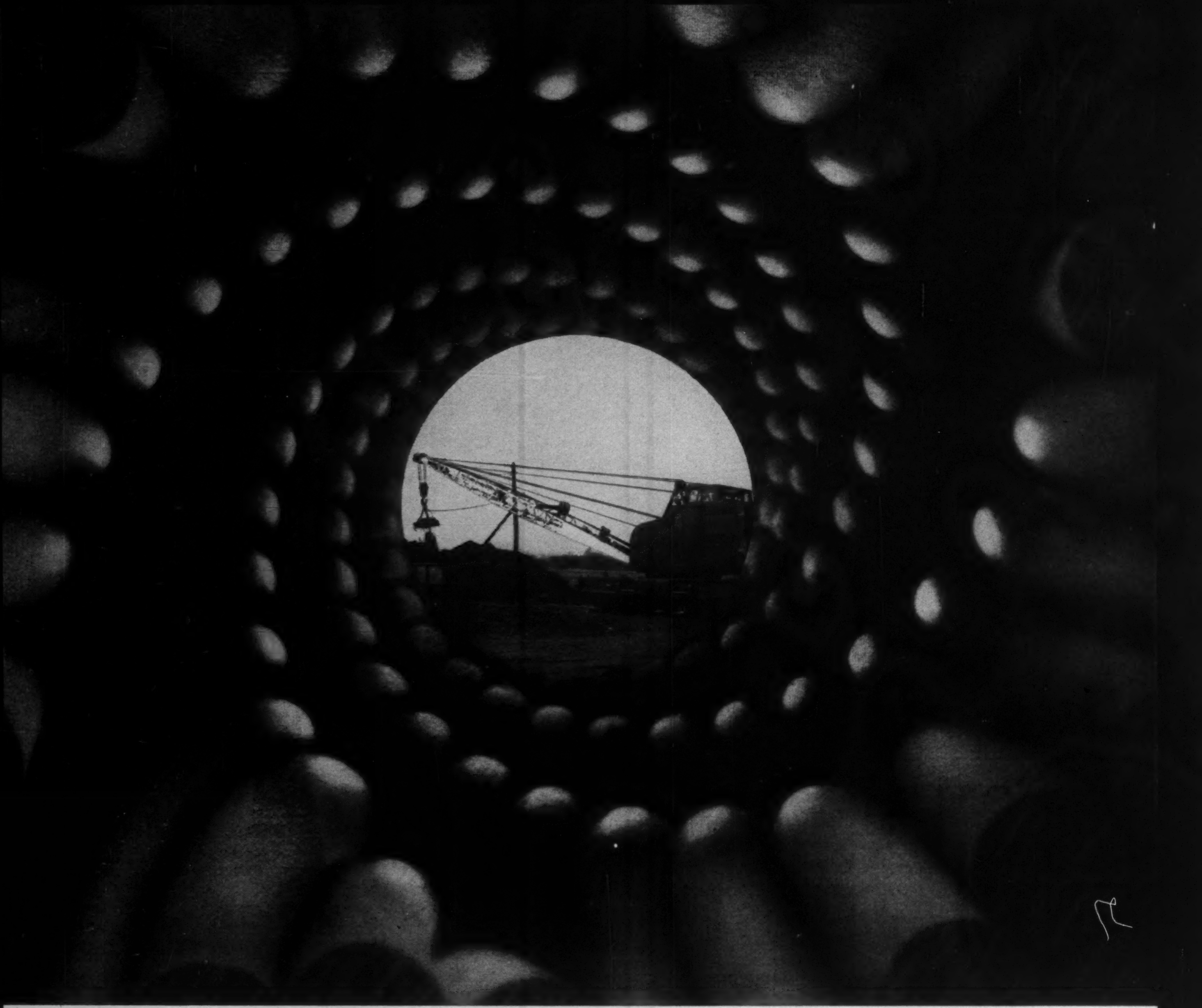


ROEBLING ROYAL BLUE WIRE ROPE

WE PUT A LOT OF WORK INTO IT—YOU GET A LOT OF WORK OUT OF IT

This happens to be the inside view of Roebling Royal Blue — its core has been removed to show the uniformity and symmetry of the rope structure. You see how concerned we are with internal security.

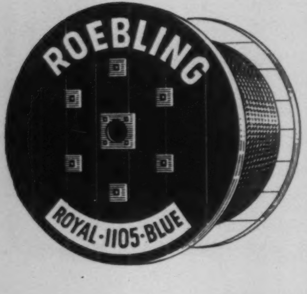
We have to be. To make sure that Royal Blue will live up to the day-to-day demands made upon it. High stresses and unavoidable overloads, abrasion, fatigue, impact, crushing, sheave pressures and abusive drum-winding, to name the major ones.

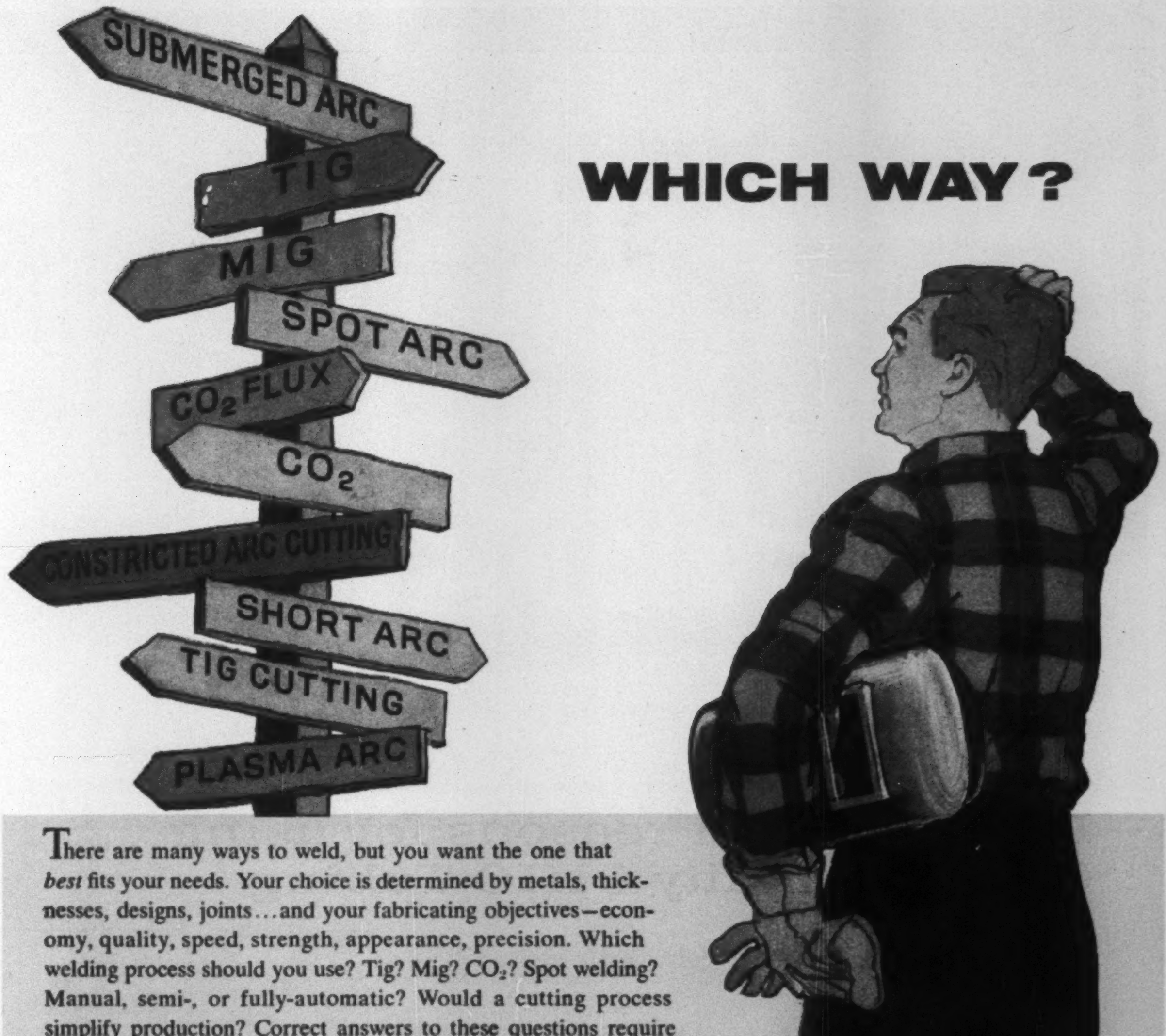
Royal Blue goes through many inspections and tests—both internal and external —before reporting to work. This way we're sure that the rope we build will do what we sell it to do. These quality-control measures are your assurance that Royal Blue is made to save you money — anyway you look at it.

For details about hard-working Royal Blue, ask your wire rope distributor or write Roebling's Wire Rope Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities • John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation





WHICH WAY?

There are many ways to weld, but you want the one that *best* fits your needs. Your choice is determined by metals, thicknesses, designs, joints...and your fabricating objectives—economy, quality, speed, strength, appearance, precision. Which welding process should you use? Tig? Mig? CO_2? Spot welding? Manual, semi-, or fully-automatic? Would a cutting process simplify production? Correct answers to these questions require experience with the major arc welding and cutting processes—from submerged arc to plasma arc—introduced during the past 25 years. LINDE has *all* of these processes. No other company does. In fact, LINDE *introduced* almost all of them...and *improved* the rest. Consequently, LINDE has far more experience with tungsten-arc cutting, inert-gas welding, and continuously-fed electrode welding than any other company in the world. In many cases, these processes are ideal. In some, they are even a necessity. Because we have all of them, we recommend only the one that *best* fits your needs. When making your choice, bear in mind that a recommendation from an equipment manufacturer is apt to be *only as accurate as the completeness of his line.*

LINDE COMPANY

UNION CARBIDE

Division of Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.

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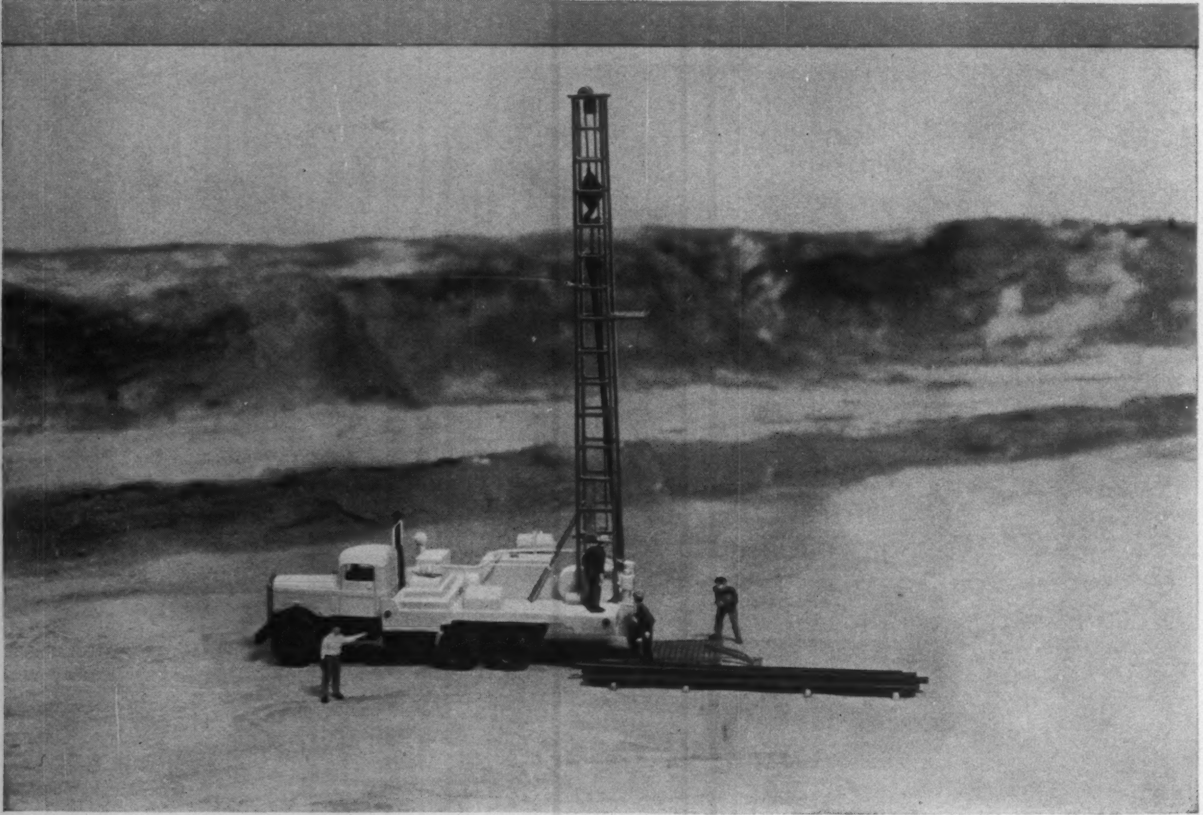


Down-to-earth reasons for using Custom Quality OHIO Tubing

As in rotary drilling, which uses steel tubing internally upset by Ohio Seamless, greater strength and lighter weight may be important in your product.

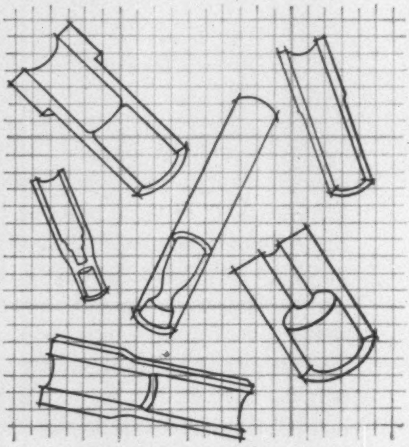
So before selecting a tubing source consider these important facts. OHIO Tubing is always the exact tubing you need for your product because OHIO Tubing is CUSTOM MADE for your product. Your order is manufactured to your own specifications to produce steel tubing especially for your application — the precise grade, analysis, size, shape, special anneal and tolerances best suited to your needs.

Ohio Seamless Tube produces both seamless and electric welded steel tubing — is prepared to form many finished or semi-finished tubular parts to your designs.

To get the most from your next steel tubing order, use Custom Made OHIO Tubing. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.

A-3061A

Model illustrated built to 3.5 mm scale.



Typical Ohio Seamless tubular upset forgings

OHIO

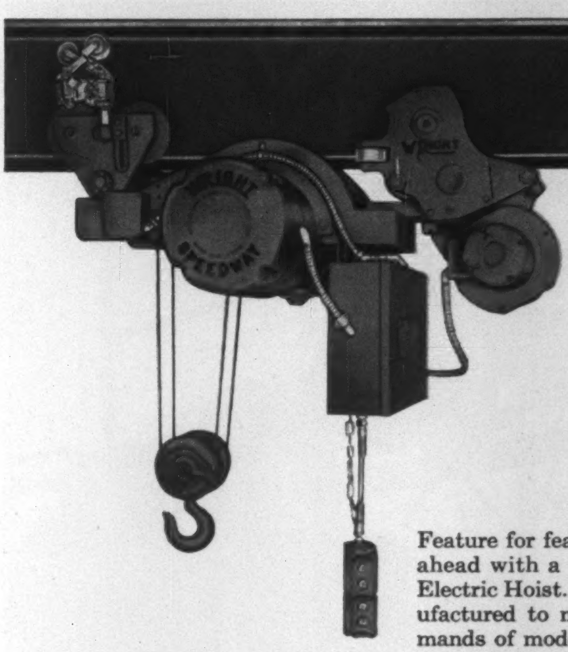
OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • **SHELBY, OHIO**

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Kansas City, Los Angeles (Lynwood), Miami, Moline, New York, New Orleans (Chalmette), Philadelphia (Wynnewood), Pittsburgh, Richmond, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita

CANADA: Railway & Power Engr. Corp., Ltd. • EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York



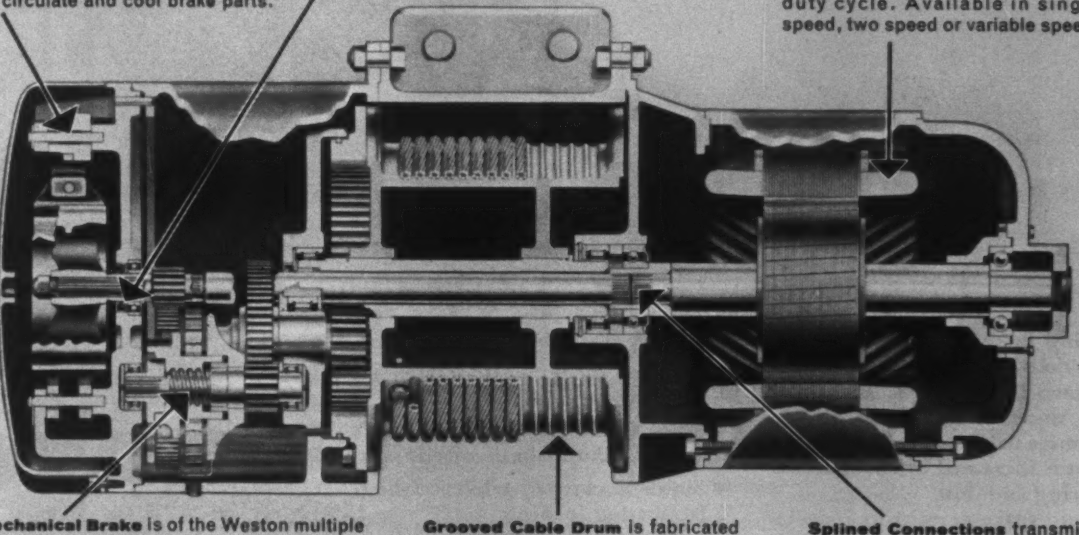
You Can't Buy a Low-Priced Hoist with the Outstanding Performance and Maintenance Features You Get as Standard Equipment from Wright

Feature for feature, you are years ahead with a WRIGHT *Speedway* Electric Hoist. Designed and manufactured to meet the varied demands of modern high speed production, *Speedway* Hoists give you the safety, adaptability, ruggedness and efficiency which you can't get in a low-priced hoist. Many of these performance and maintenance features are exclusive with WRIGHT. So if you are considering the purchase of an electric hoist, it will pay you to investigate the advantages of WRIGHT *Speedway* Hoists. For complete information, write our York, Pa., headquarters for **Catalog E-58.**

Motor Brake is the solenoid-operated external expanding jaw type. Fan-shaped brake wheel induces air to circulate and cool brake parts.

Bearings • Precision ball or roller bearings support all moving shafts—insure high efficiency, durability and low maintenance.

Motors are fully enclosed, ball bearing type. Built to NEMA Specifications. Rated on basis of 30-minute duty cycle. Available in single speed, two speed or variable speed.



Mechanical Brake is of the Weston multiple disc type operating in bath of oil. Brake linings cemented to braking members instead of being riveted, thus increasing braking area for greater duty cycle.

Grooved Cable Drum is fabricated from rolled steel sections, machine-grooved to take full lift without overwinding. Extra wraps give added safety when hook is in lowest position.

Splined Connections transmit torques with minimum stress and distortion. Permits motor replacement with less effort even when hoist is under load.

See your WRIGHT Distributor
about the Speedway Electric Hoist line in the ¼ to 10-ton capacity range

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc.

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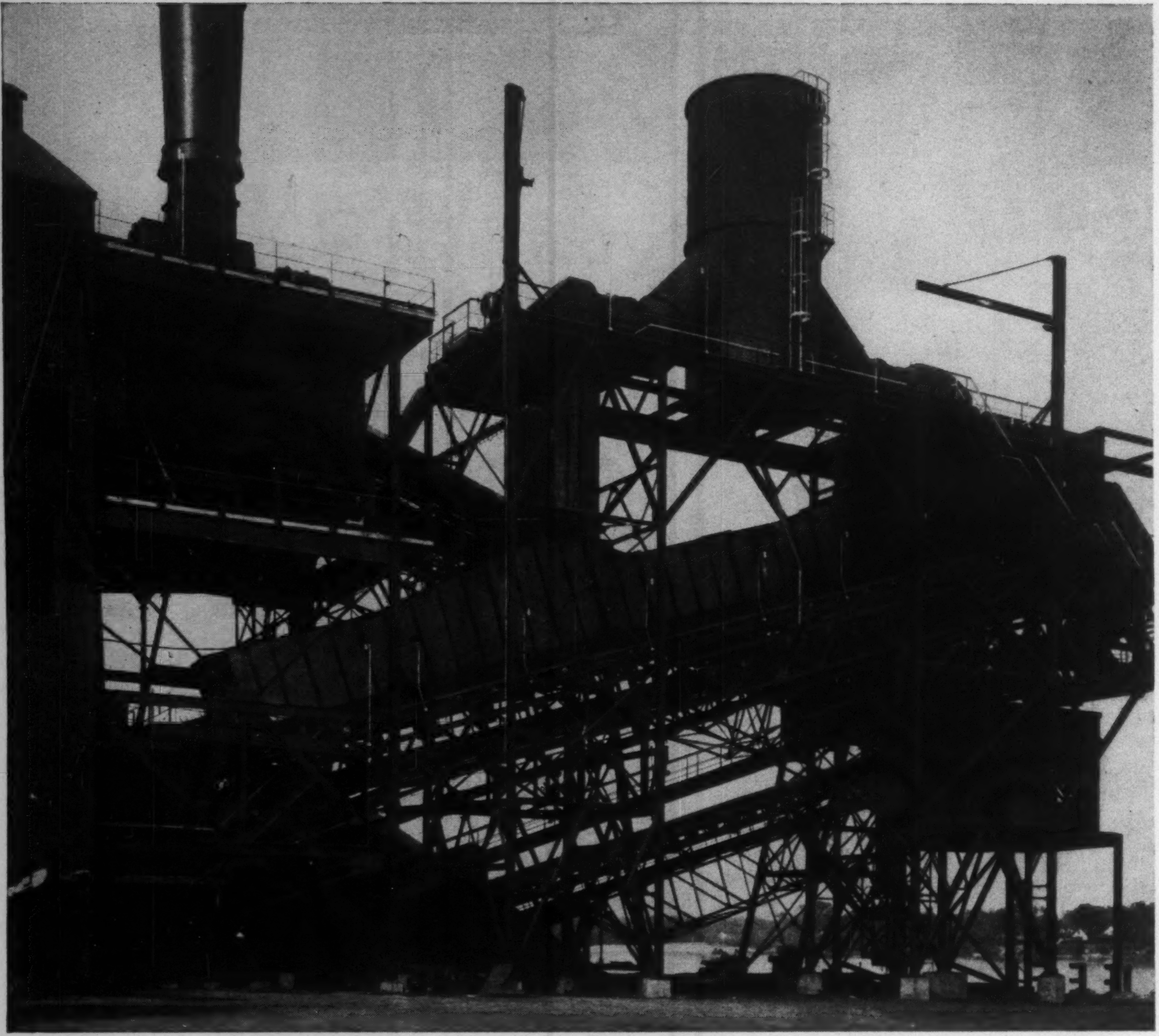

sinter air-cooled and elevated at same time . . .

DRAVO-LURGI STRAIGHT LINE COOLER

Utilizing the air-cooling principle which delivers more *usable* tonnage, the Dravo-Lurgi straight line cooler raises sinter at the discharge end for storage in bins or for conveying. Output is increased by reduction of shattering and dust.

Where space permits its installation, the straight line design provides an extremely efficient method for both cooling and handling sinter. Here are some of the features which lead to maximum utilization of any sinter machine:

- No water quenching to cause shattering, cracking or brittleness.
- No need for plows or scrapers at the discharge end.
- Sinter is undisturbed during cooling—breakup is minimized.
- Sinter is elevated while cooling, facilitating loading.

A Dravo engineer will be glad to explain how Dravo-Lurgi coolers (either straight line or circular) can increase *usable* tonnage in your sintering operation. Write or phone DRAVO CORPORATION, PITTSBURGH 22, PENNSYLVANIA.

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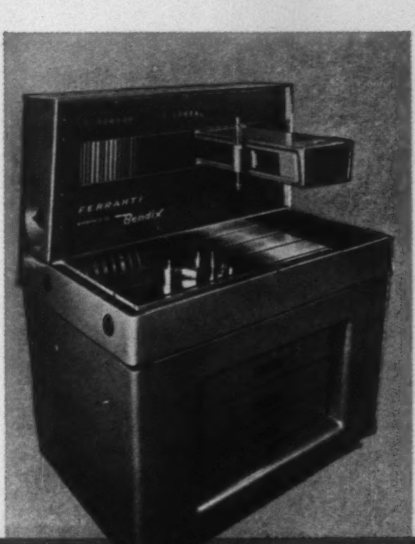
INSPECTION BREAKTHROUGH!

BENDIX ANNOUNCES New Coordinate Machine that inspects work pieces up to 10 times faster

The Bendix Industrial Controls Section and Ferranti, Ltd. have teamed up to bring the American metalworking industry a new concept in two-dimensional inspection equipment.

The revolutionary FI-22 coordinate measuring machine provides direct and continuous readout of hole center locations with one-set-up simplicity and with 0.001″ accuracy over its entire 15″ x 24″ range.

Operator errors due to misuse or misreading of inspection instruments are essentially eliminated—one inspector can do the work of several with the help of the transistorized counting circuits and advanced mechanical design of the FI-22.



14·350+

Readout display numbers shown here are actual size.

The FI-22 features such other advantages as:

Large readout display—one set for each axis—little chance to misread these bright, ¾-inch digits.

Floating zero—set up at any point—measure in any direction.

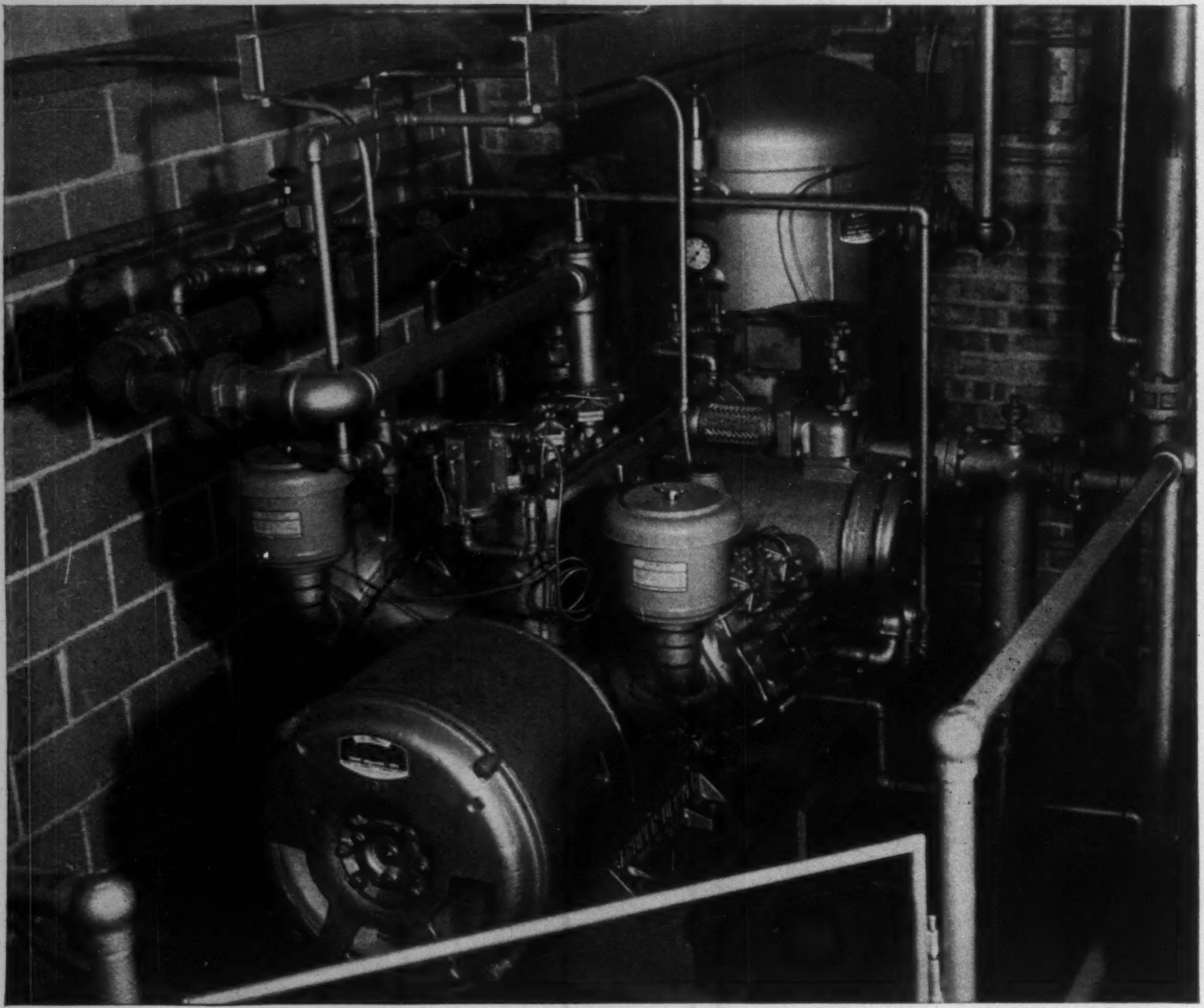
Doubles as layout machine—for still further time savings.

Interchangeable probe tips—inspect any hole or surface location.

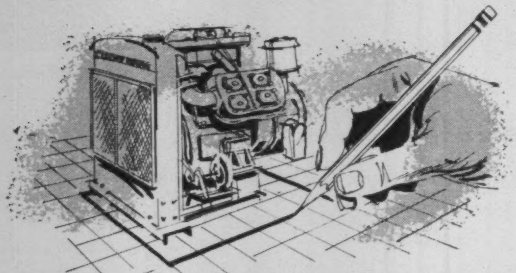
Backed by complete Bendix service and customer training programs. For additional information, contact us today.

Industrial Controls Section
21820 Wyoming, Detroit 37, Michigan

THE Bendix CORPORATION



Space-Saving Cost-Cutter—Gardner-Denver WB



SAVING YOUR FLOOR-SPACE DOLLARS—that's one more example of Gardner-Denver Engineering Foresight. Our engineers know your problems . . . design equipment to fit your needs. At Gardner-Denver there's no substitute for men—our philosophy as we enter our second century of service.

Here's everything you could want in an air compressor. And look how compact this space-saver is. Quickly spot it in a corner, hook it up, and it runs for years without the touch of a wrench.

The picture above is typical of a complete Gardner-Denver WB compressor package. Includes clean air aftercooler complete with moisture separator, air receiver and automatic controls.

Save floor-space dollars and get a lasting supply of compressed air with a Gardner-Denver WB. Choose from seven sizes—142 to 1150 cfm piston displacement. Each size is a packaged unit that's easily and quickly installed without costly foundation work. Write for Bulletin WB-10 or consult your Gardner-Denver compressor specialist.

GARDNER-DENVER Since 1859

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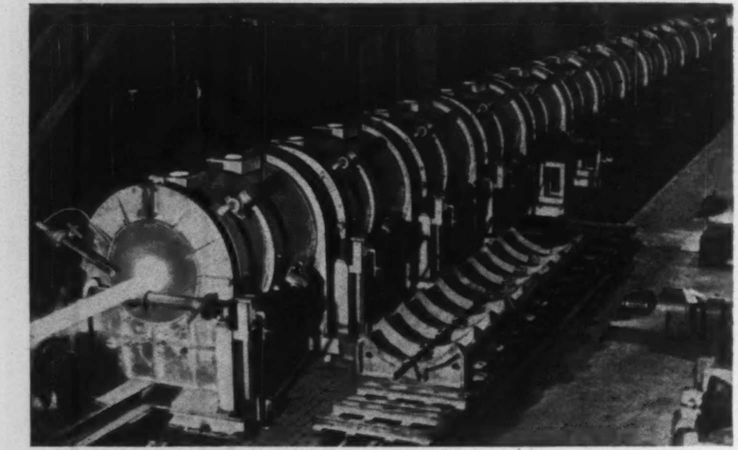
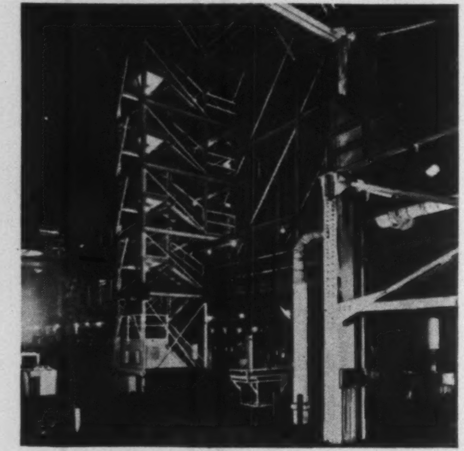
NEW SLANTS ON HEAT PROCESSING FROM SELAS

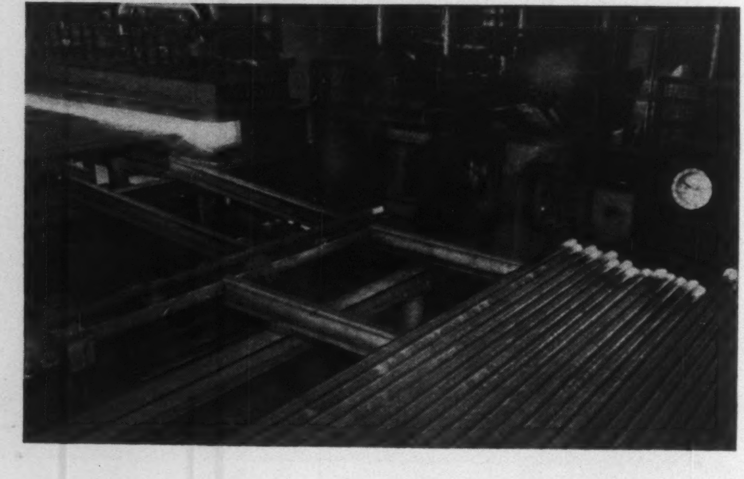
Here's how the Steel Industry uses



TUBING . . . *is normalized and, if required, stretch-reduced in this Selas barrel-furnace line. After forming and welding, the tubing is conveyed through a 48-barrel normalizing line with exit temperature approximately 1650°F. Stretch-mill product proceeds through additional 12 Gradiation furnaces which heat tubing to 1800°-1850°F. Entire process is automated.*

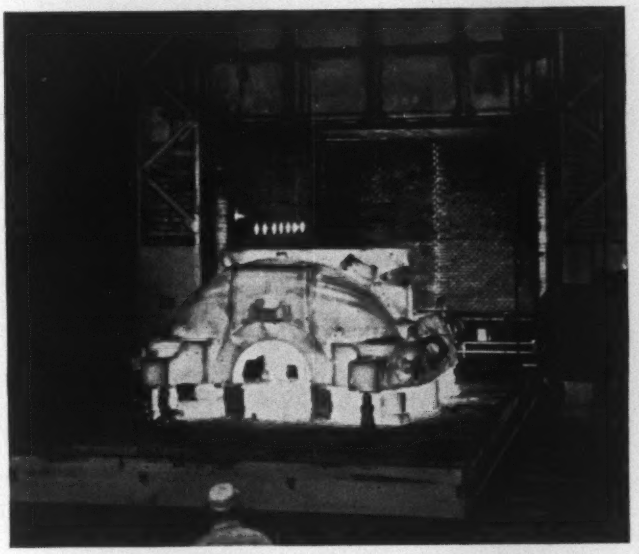


STRIP *is continuously bright-annealed in this single-pass, direct-fired furnace. Designed for fast, uniform heating, Gradiation strip lines are compact, easy to install, simple to operate, economical to maintain. This concept of strip heating is also used for bright-annealing of stainless steel, tin reflow, galvanizing - annealing, blueing, preheat for galvanizing and annealing.*



TUBE-ENDS *are heated for upsetting (for subsequent threading) in this slot-type Selas furnace. As each tube-end is fast heated to 2300°F, the tubing automatically moves down handling table to upsetting machine. Direct - fired Duradiant® gas burners are patterned to assure temperature uniformity within limited area of each tube-end.*

Selas Heat Processing



CASTINGS *of high alloy steel are hardened and toughened in Selas Gradiation-fired car-bottom furnace. Picture shows 35-ton turbine shell casting after heating to 1925°F and held at temperature for 10 hr. Turn of valve converts furnace to lower temperature unit for reheat following air-cooling. Time cycle required for this operation reduced 20% through Gradiation fast heat-up and control.*

Throughout the steel industry—in mills and metalworking plants—Selas Gradiation® heat processing is used successfully in many operations. The versatility and adaptability of the Gradiation principle are demonstrated by the diversity of applications shown in the installation photographs on these pages.

Gradiation is a concept and technique of heat processing which coordinates fast, controlled heating with the nature of the workpiece . . . considering its composition, size, shape, heat transfer characteristics and physical properties . . . to develop desired product quality, in minimum time, with maximum efficiency, and with the use of automatic and compact equipment.

Designed and custom-built to meet your specific heat processing needs . . . for hot working . . . galvanizing . . . tinning . . . heat treating heavy sections and special shapes . . . Gradiation equipment contributes production economy, high production rates, ease of handling.

At your convenience . . . without cost or obligation to you . . . a Selas field engineer would welcome the opportunity to survey your needs. For this personal service—or for a copy of our new Bulletin "Selas Gradiation Heating in the Steel Mill"—contact our Steel Mill Division Office, 300 Mt. Lebanon Blvd., Pittsburgh 34, or our furnace Division, Dresher.

SELAS CORPORATION OF AMERICA
111 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A., Pregny, Geneva, Switzerland. INTERNATIONAL AFFILIATES: FRANCE — Societe Exploitation de Produits Industriels, Paris; JAPAN — International Machine Co., Ltd., Tokyo.

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SELAS

HEAT AND FLUID PROCESSING ENGINEERS

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Steels and irons with "vitality" to spare...*start with Vancoram Ferrovanadium*

It takes only a small amount of Vancoram Ferrovanadium to impart *extra* strength and *extra* durability to a wide variety of steels and irons. Ferrovanadium controls grain size, improves hardenability, and is especially useful in tool and die steels because it provides excellent cutting and wearing characteristics. Constructional steels, deep-drawing steels, and cast and forged steels also benefit from Vancoram Ferrovanadium additions.

In cast irons, Ferrovanadium promotes formation of small, uniform graphite flakes, thus increasing tensile strength. Furthermore, the presence of vanadium carbide improves resistance to structural changes at elevated temperatures. Write for literature, or call your nearest VCA District Office. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh.

Vancoram Products are also distributed by: Pacific Metals Co., Ltd. • Steel Sales Corporation • J. M. Tull Metal and Supply Co., Inc. • Whitehead Metals, Inc. • Williams and Company, Inc.

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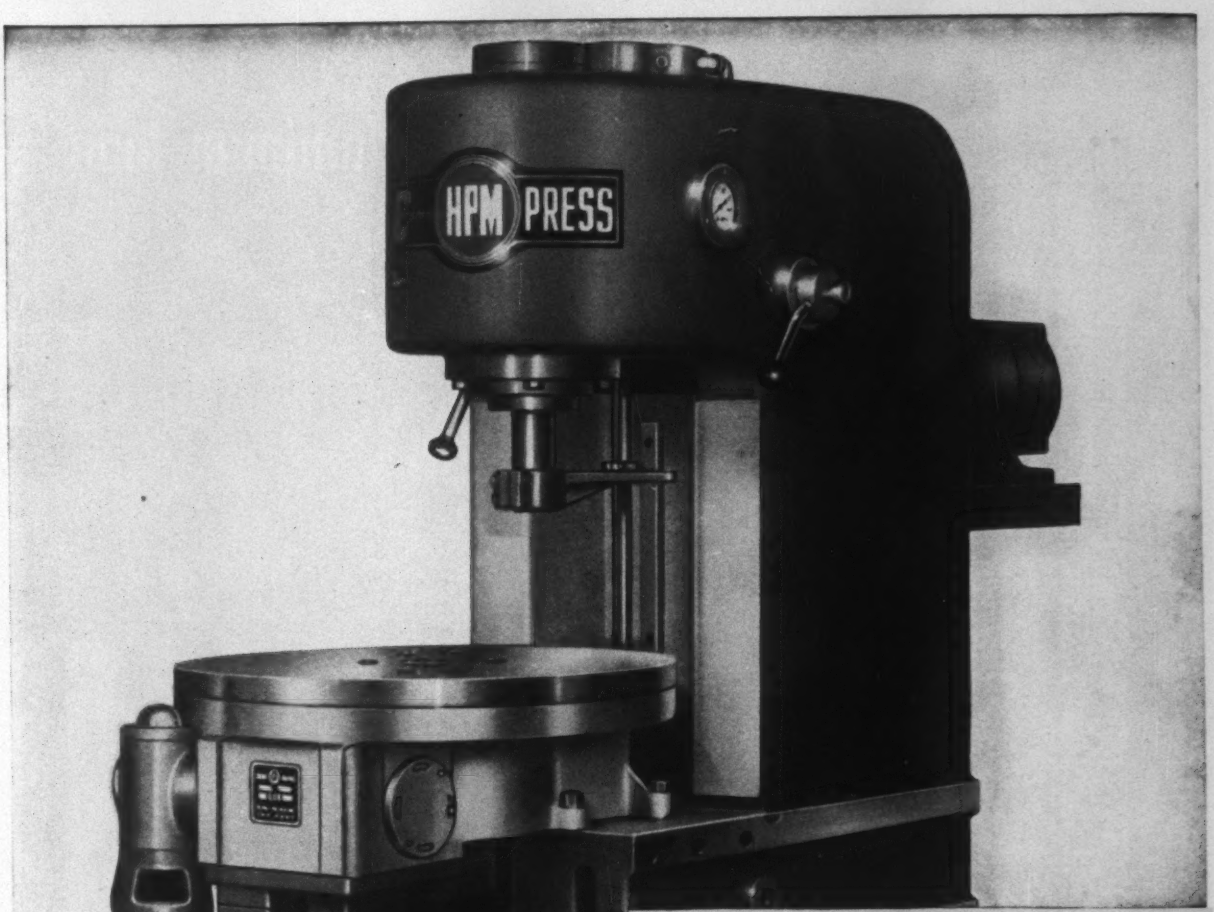
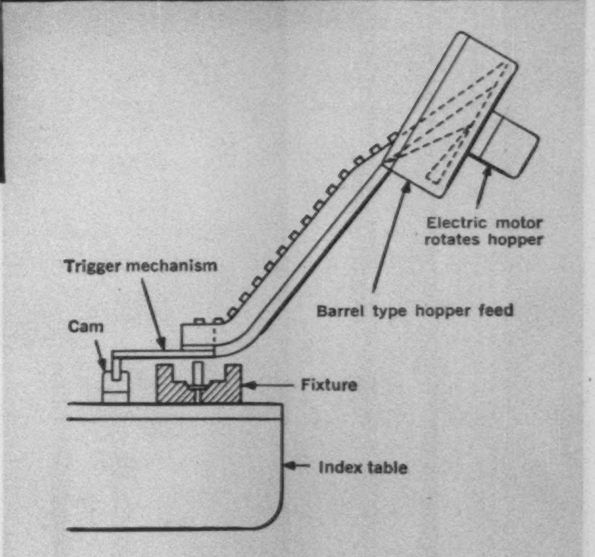


This packaged potential for complete automation requires only proper tooling to make it 100% automatic. Retooled for specific jobs its usefulness can be extended many times.



PRACTICAL AUTOMATION UNDER $10,000

Eliminates Parts Handling, Eliminates Manual Skill

Both quality and production output benefit when the H-P-M automatic index table is put to work. With all press motions easily preadjusted for correct pressure, stroke and ram speed, the uniformity of force applied to finished parts is removed from the realm of guesswork. With automatic loading of parts for many small assemblies, manual effort is removed from the job. These two elements, in combination, assure better quality, faster production at lower cost.

The H-P-M C-Press is available in 5, 10, and 15-ton models for the bulk of mass produced assembly work in your shop. Let an H-P-M field engineer explain how low cost automation with H-P-M's can be put to work for you; how this initial investment in modernization can be applied and reapplied to countless production tasks.

Many small parts can be hopper fed as typified in this sketch. Eliminate the fumbling and slowdown of feeding small parts manually and your production will improve by "hundreds" per day.

HPM

H948

THE HYDRAULIC PRESS MFG. COMPANY
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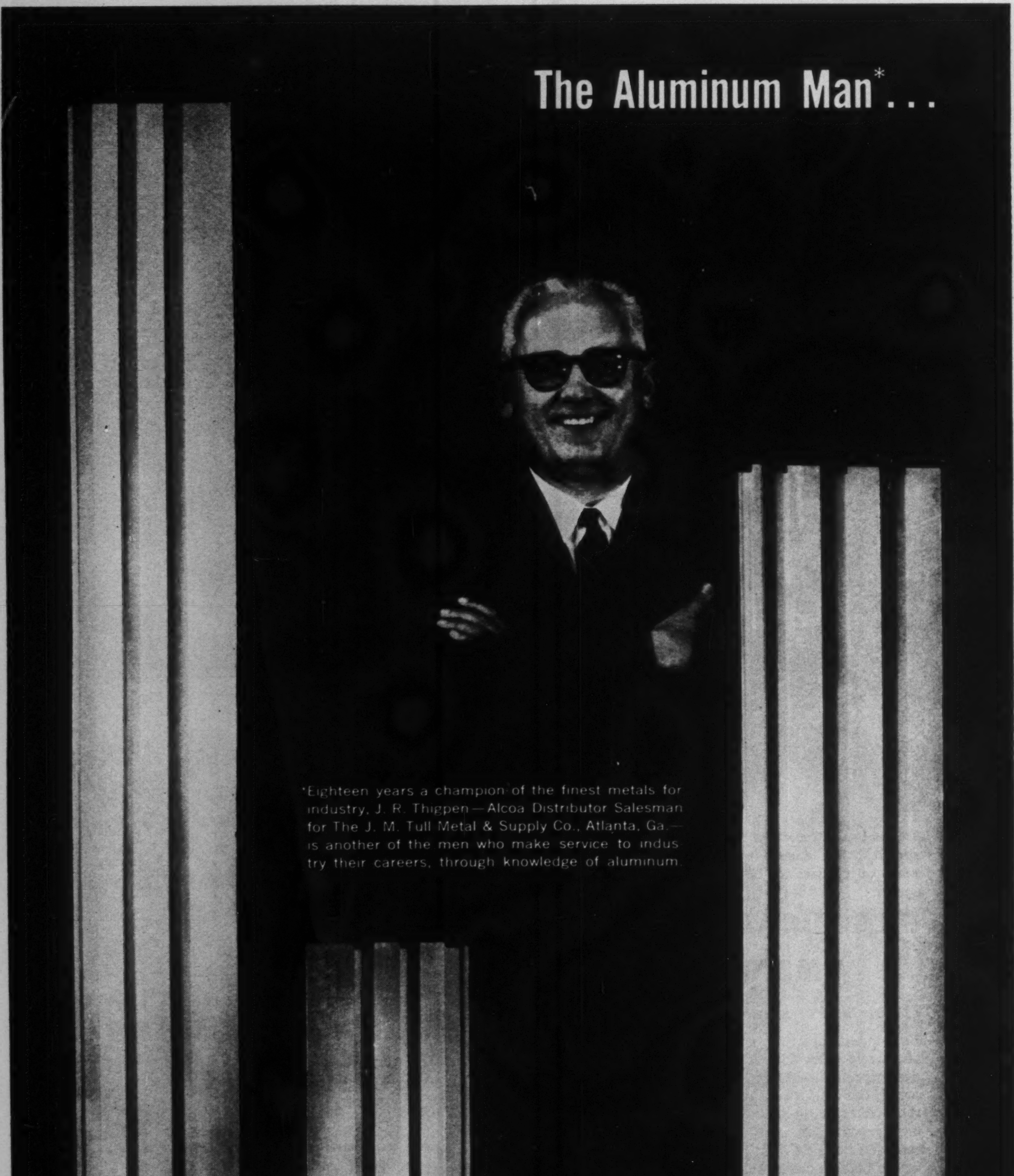

The Aluminum Man*...

*Eighteen years a champion of the finest metals for industry, J. R. Thigpen—Alcoa Distributor Salesman for The J. M. Tull Metal & Supply Co., Atlanta, Ga.—is another of the men who make service to industry their careers, through knowledge of aluminum.

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Your *Aluminum Man's* advice and services are always available—the technical know-how of Alcoa, the aluminum pioneer behind these products, is yours for the asking. Be sure always to specify *Alcoa Aluminum*—the light metal with the bright future that's being seen in more places—more and more! Aluminum Company of America, 926-L Alcoa Building, Pittsburgh 19, Pa.

Call The Aluminum Man . . . he's your Alcoa Distributor Salesman for aluminum sheet and plate, tube and pipe, wire, rod, and bar, and all Alcoa Mill Products.

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*Home Office

Bearing at left has 1.75" bore, while tandem bearing in main illustration has 17.0" bore. *Yet both are standard, cataloged items.*

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When you need a thrust bearing, no matter how special, Rollway is ready with the know-how and the precision machinery to design and produce it for you.

Our engineers will gladly consult with you regarding any standard or special-purpose types you need. No cost. No obligation. Rollway Bearing Co., Inc., Syracuse. N. Y.

Complete line of Radial and Thrust Cylindrical Roller Bearings

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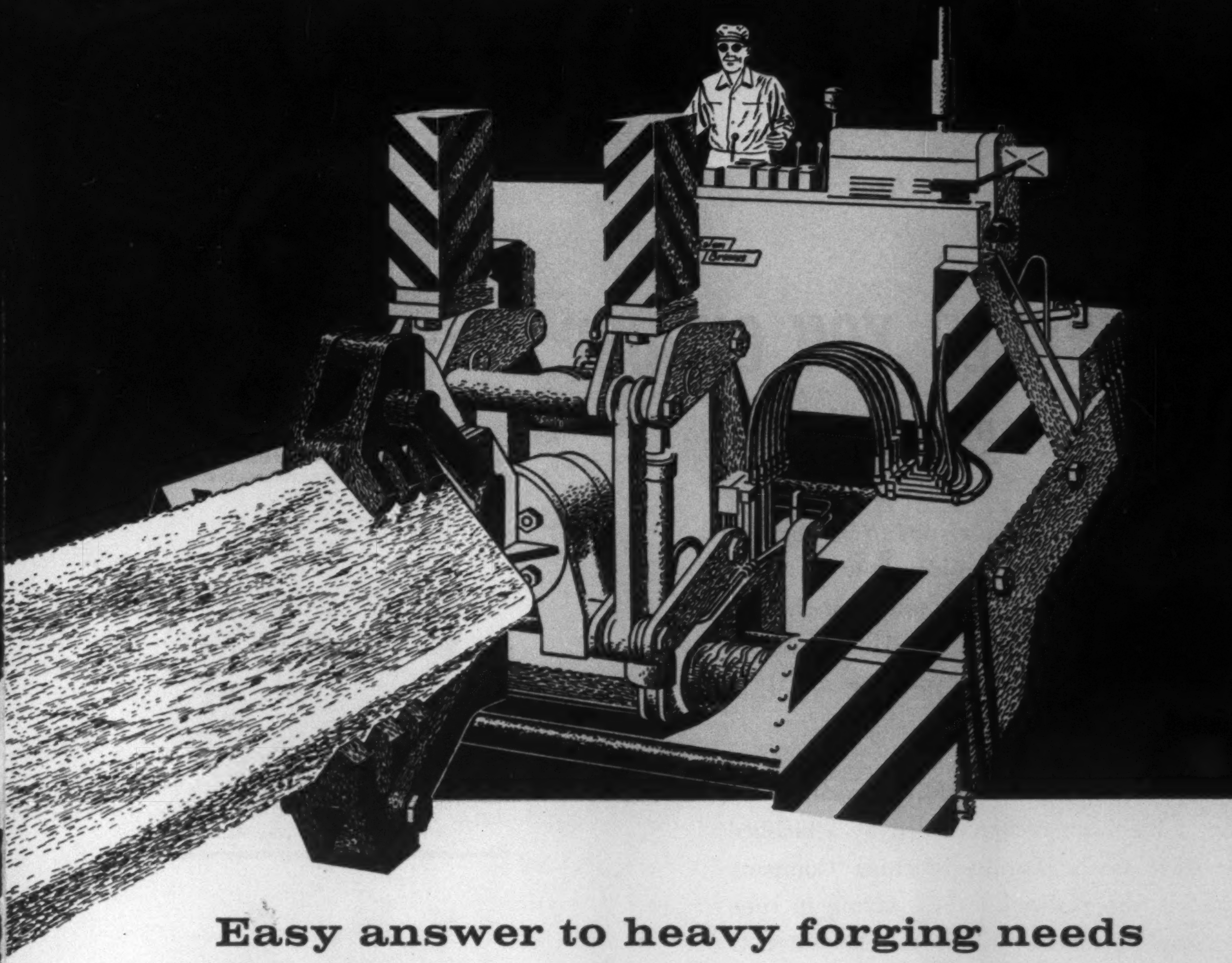
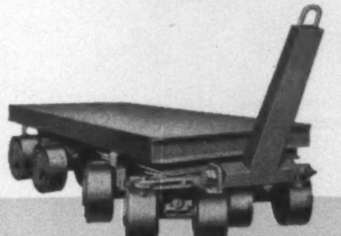


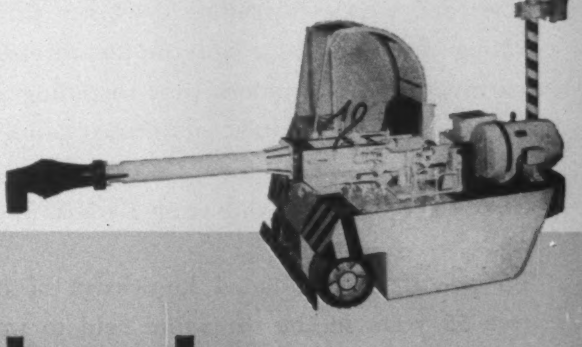
Easy answer to heavy forging needs

The free-moving Salem-Brosius rubber-tired manipulator adds speed, safety and economy to open-die forging. At hammer or press it raises, lowers, tilts, rotates or laterally moves the hot stock, satisfying forge manipulating requirements. Also, it can charge or draw forge shop furnaces, operating with the facility of a fork-lift truck in hot or cold stock handling. The Salem-Brosius Manipulator saves floor space. It travels to furnaces and presses or hammers without freezing floor space with tracks or overhead areas with craneways.

This ruggedly-built machine meets the trend of industry toward hammer and press forging of high alloy, stainless and tool steels, and the many new extremely hard refractory-type alloys. The forging of these metals necessitates manipulating equipment of extreme durability. Write for further information.



Two other prominent members of the Salem-Brosius family of materials handling equipment are heavy-duty in-plant trailers (left) and the exclusive rubber-tired type furnace chargers shown at the right. Ask about them when you inquire about the manipulator.



Salem-Brosius, Inc.

PITTSBURGH, PENNSYLVANIA

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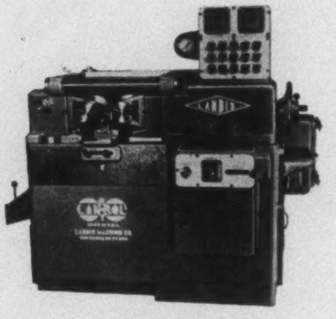
HOW WOULD *YOU* CHOOSE *a threading machine?*

Would you consider the results to be obtained first? Or, would you consider how much it's going to cost first? Perhaps your first thought would be to check on the reliability of the manufacturer. Could be you are strictly a name-brand buyer.

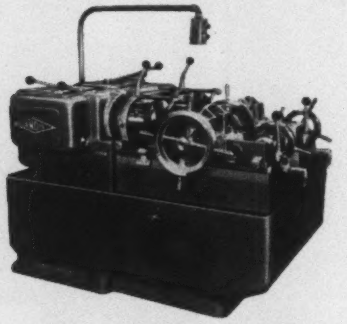
Maybe you choose a threading machine because it has been recommended by a satisfied user such as the Landis Machine Company customer who realized a 90% saving in time threading power screws on a LANDMACO Theading Machine.

How you would choose a threading machine of course only you can answer. But doesn't it make good sense to buy from a world leader such as LANDIS Machine COMPANY? All kinds and sizes of threading machines, thread rolling machines, pipe and nipple threading machines, thread grinders, pipe threading and cutting machines, and automatic coupling tapping machines to meet every threading requirement are available from Landis.

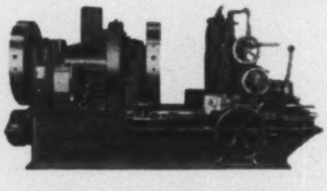
To put the accumulated knowledge of our over 55 years in the threading field to work for you is as close as your phone.



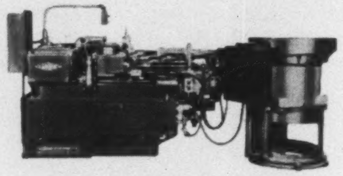
Thread Rolling Machines



LANDMACO Threading Machines



Pipe Threading Machines



Automatic Nipple Machines

LANDIS *Machine* COMPANY
WAYNESBORO • PENNSYLVANIA

596

● Mills that strive for uniformity of production appreciate that Palmoshield roll oil is compounded to their specific needs and never varies in uniformity thereafter.

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SHIELD PRODUCTS

All-domestic lubricants, under laboratory control.
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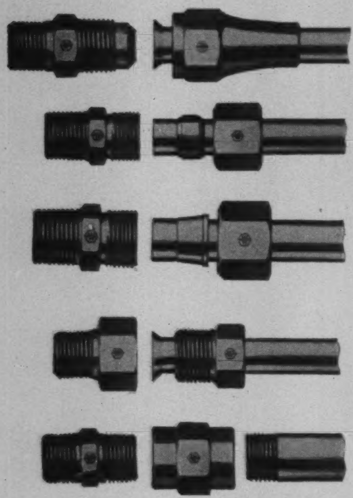
brass tube fittings



S.A.E. 45° FLARE
USE with copper, brass, aluminum, steel and plastic tubing. U.L. listed; A.G.A. approved. Meets SAE Hydraulic standards and A.S.A. and A.S.M.E. codes. PRESSURE RATING: up to 3000 p.s.i. Sizes: 1/8" to 3/4".

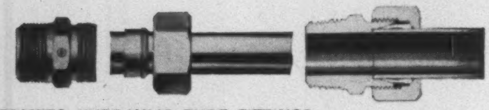
COMPRESSION
USE with copper, brass, aluminum and plastic tubing. U.L. listed; A.G.A. approved. Meets SAE Hydraulic Tube Fittings Standards and A.S.A. and A.S.M.E. codes. PRESSURE RATING: up to 2000 p.s.i. depending on O.D. of tube. Sizes: 1/8" to 3/4".

SELF-ALIGN®
USE with copper, brass, aluminum and plastic tubing. No flaring, soldering, welding, or special tube preparation needed. PRESSURE RATING: up to 2000 p.s.i. Sizes: 1/8" to 3/4".

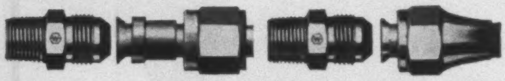
INVERTED FLARE
USE with copper, brass, aluminum, steel and plastic tubing. Meets SAE Hydraulic Tube Fittings and A.S.A. and A.S.M.E. codes. PRESSURE RATING: up to 3000 p.s.i. Sizes: 1/8" to 3/4".

PIPE FITTINGS
USE with brass or steel pipe. Meets specifications of SAE TPHL Fittings Committee. PRESSURE RATING: up to 5000 p.s.i. Sizes 1/8" to 3/4".

forged steel fittings



ERMETO HYDRAULIC TUBE FITTINGS
Most dependable high pressure fitting in the world . . . easiest installation. FOR FLARELESS TUBE SYSTEMS. No flaring, threading, welding or soldering. Available with carbon steel; stainless steel; cadmium plated or Weathercote finish. Standard Sizes: 1/8" through 2". Pressure Ratings: up to 10,000 p.s.i.



FLARE-TWIN HYDRAULIC TUBE FITTINGS
SAE 37° FLARE (J.I.C.) STEEL FOR FLARE TUBE SYSTEMS. No threading, welding or soldering. Two-pc. and three-pc. carbon and stainless steel with cadmium plated or Weathercote finish. Standard sizes: 1/8" through 2". Pressure Ratings: up to 10,000 p.s.i.

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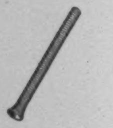
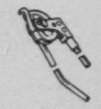
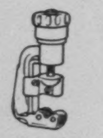
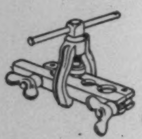
tube working tools

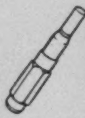
Designed to make fast, easy work of every tubing job. We offer a complete line of low cost, quality made tools for cutting, bending and flaring tubing up to 3/4" in O.D.

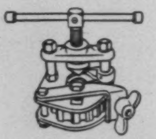

Spring-Type Bender


Mechanical Bender


Tube Cutter

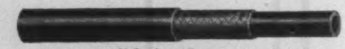

Bar-Type Flaring

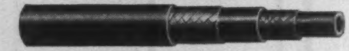

Swaging

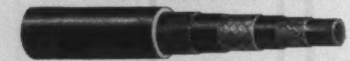

Burnishing Flaring

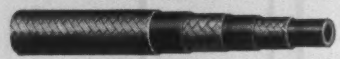
hose

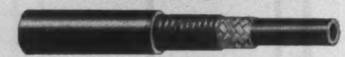
Available in over 20 different types for any industrial application up to 10,000 p.s.i. pressures and sizes from 1/8" to 2" I.D. Five standard hoses meet most requirements.


H-9—Low Pressure

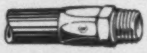

H-17—Medium Pressure

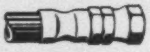

H-25—High Pressure

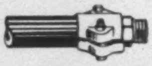

H-69—Medium High Pressure

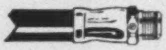

H-108—Medium High Pressure

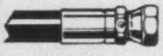
hose assemblies

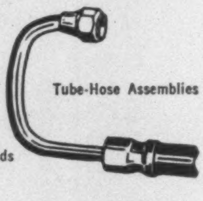

Standard 2-pc. Reusable Ends


Reusable Steel Ends


Reusable Clamp-Type Ends


Permanently Crimped Ends


Permanently Swaged Ends


Tube-Hose Assemblies

YOUR SINGLE SOURCE SUPPLIER OF ALL INDUSTRIAL HOSE AND FITTINGS NEEDS

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FORT WAYNE DIVISION • Dept. IA-11, 128 West Washington Blvd. • Fort Wayne, Indiana
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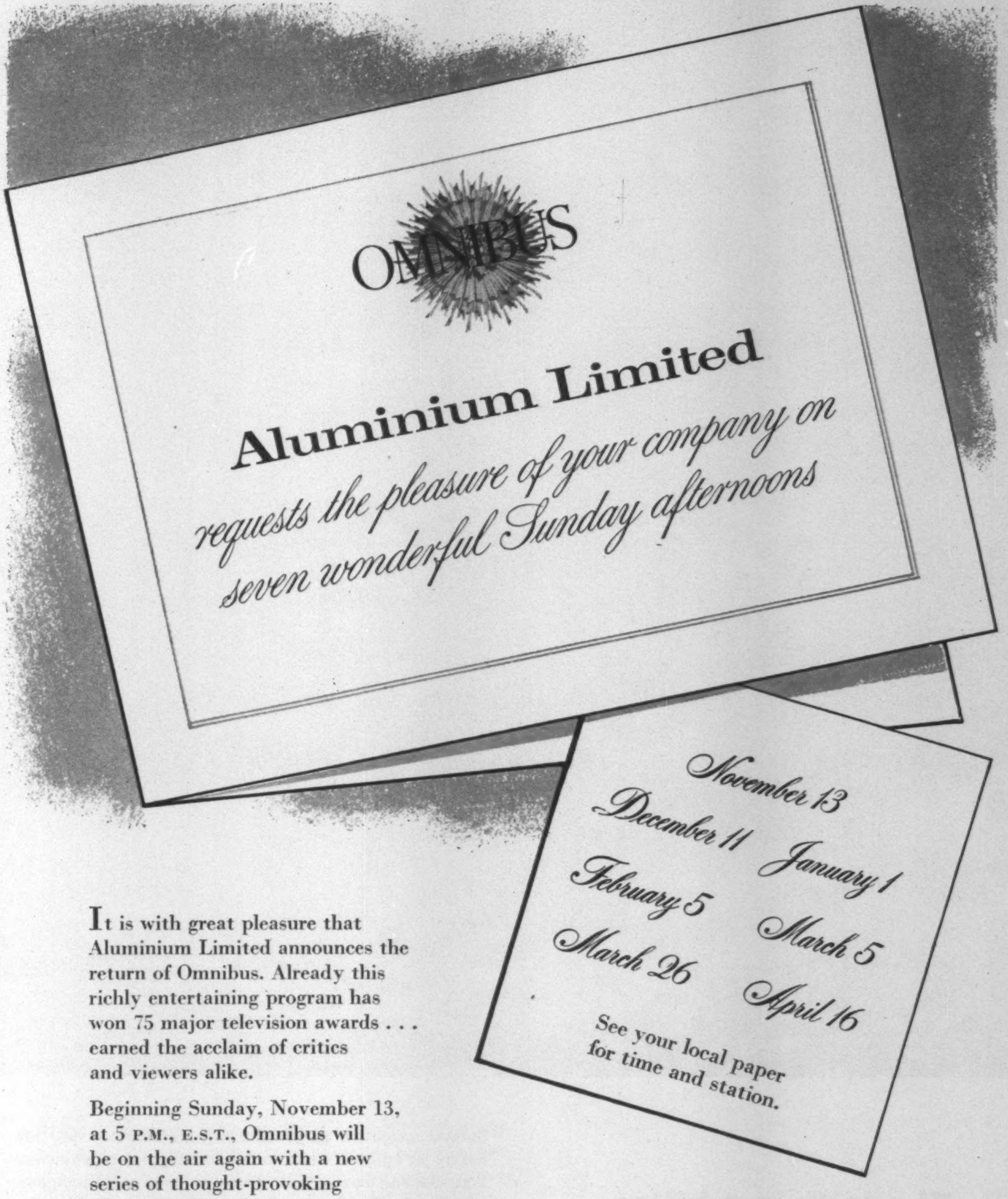


OMNIBUS

Aluminium Limited

requests the pleasure of your company on seven wonderful Sunday afternoons

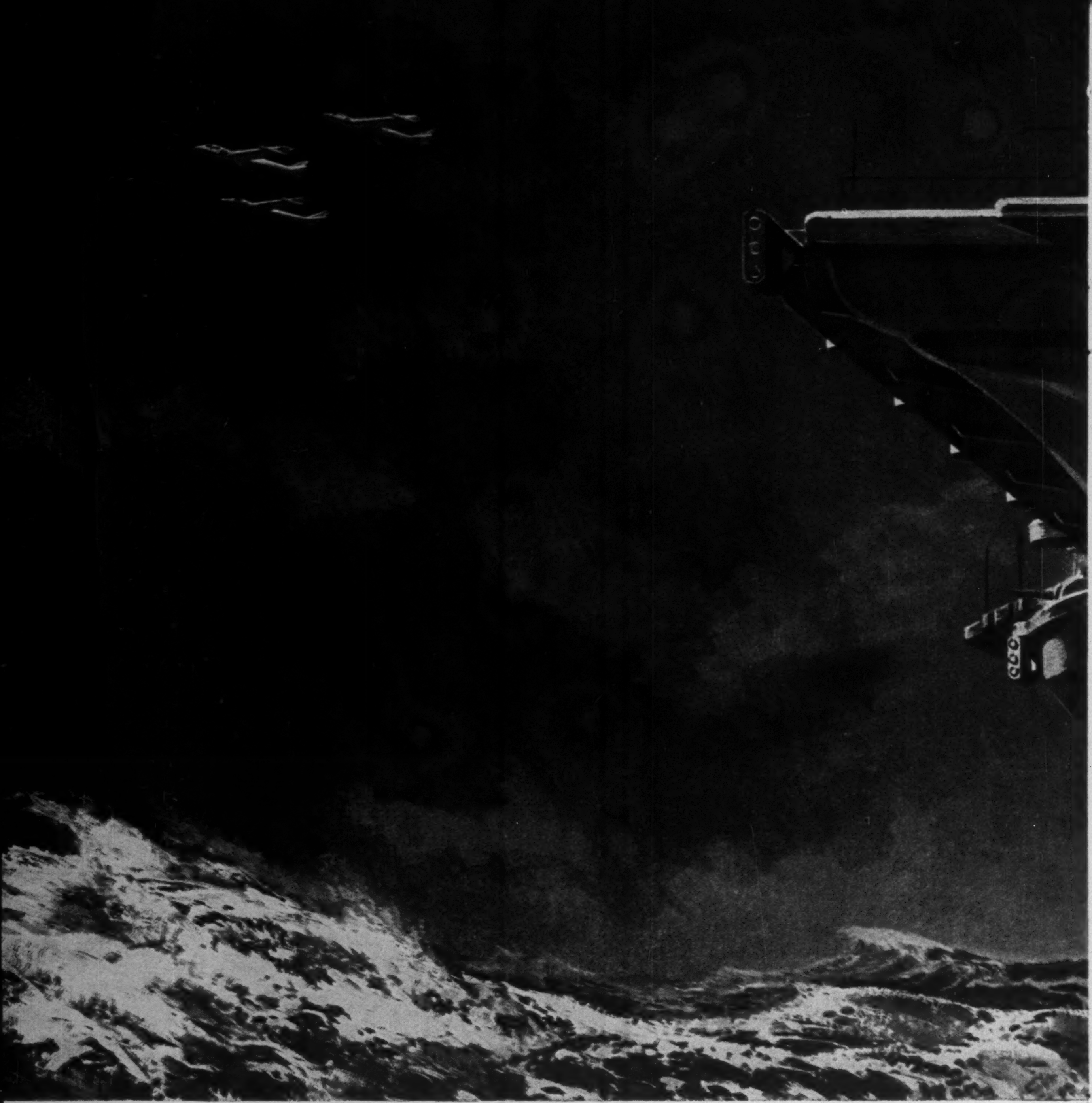
November 13
December 11
January 1
February 5
March 5
March 26
April 16

See your local paper for time and station.

It is with great pleasure that Aluminium Limited announces the return of Omnibus. Already this richly entertaining program has won 75 major television awards . . . earned the acclaim of critics and viewers alike.

Beginning Sunday, November 13, at 5 P.M., E.S.T., Omnibus will be on the air again with a new series of thought-provoking pieces . . . brought to you for the 6th season by one of North America's great aluminum producers. Aluminium Limited Sales, Inc., 630 Fifth Ave., New York 20, N. Y.

Aluminium Limited ALCAN



The lady is a killer

Tough, fast and maneuverable, this is 60,000 tons of fighting ship. She's the Navy's newest and biggest jet-age aircraft carrier—the USS Independence.

This mark tells you a product is made of modern, dependable Steel.

Stowed inside her gargantuan hull are approximately 100 deadly jet fighters. Her armor-plated flight deck stretches 1,000 feet and laps an area of 4 acres. And, she's equipped with four catapults that can snap four jets howling into the air in thirty-eight seconds.

She's fast. The lady easily batters through foam-tipped waves at better than 30 knots. She's maneuverable. The Independence can follow a difficult zig-zag pattern and still cruise a distance of 600 miles in a twenty-four hour period.

To help transmit her great power from eight massive boilers, National Tube supplied over 16,000 feet of USS

National Seamless Pressure Tubes in both carbon and alloy steels for use in steam lines, as well as over 4,000 feet of Standard Pipe. In addition, National Tube also furnished a number of Seamless Steel Cylinders for air actuating systems and recharging breathing units.

For the past 80 years, National Tube has handled tough tubular installations in the fields of line pipe, pressure tubing, mechanical tubing and oil country tubular products. For assistance, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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USS

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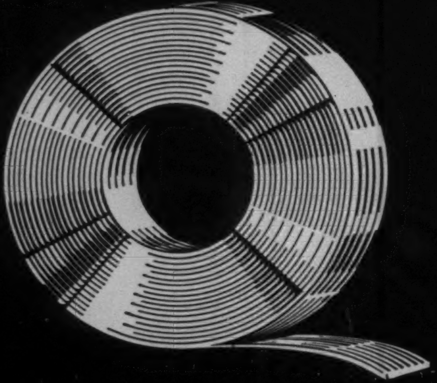
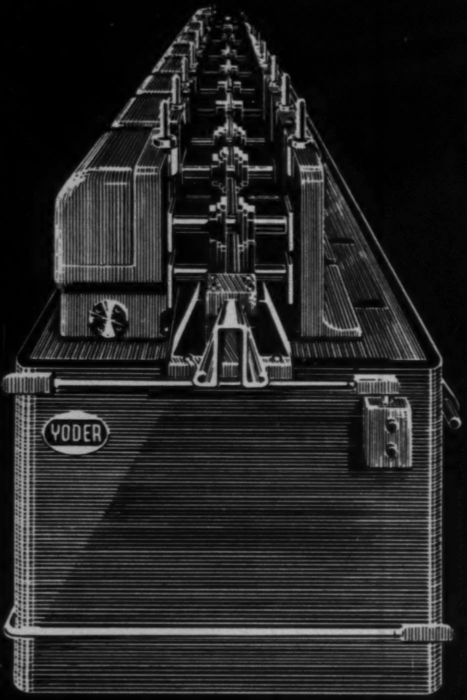
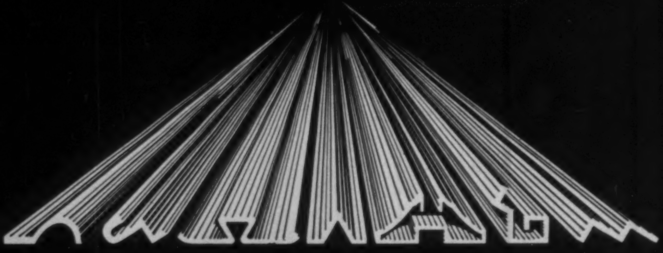
. . . from start





. . . to finish



COLD ROLL-FORMING EQUIPMENT

PIPE AND TUBE MILLS (ferrous or non-ferrous)
ROTARY SLITTING LINES

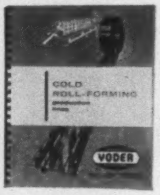
YODER ROLL-FORMING EQUIPMENT

Profits are available to you through the production of many shapes in metal... made with precision and economy on Yoder Cold Roll Forming Equipment.

Produce tubular, ornamental or structural shapes from a variety of metals in widths from a fraction of an inch up to 80 inches or more, and in stock up to ¾" thick. Your investment is comparatively modest, and with proven low operating costs, will give you one of the most profitable operations in your plant.

Experienced Yoder engineers will, without obligation, study your annual metal forming requirements. Many times they can point out that the installation of roll forming equipment would—even if operated only intermittently—soon justify its initial cost.

Send today for this comprehensive, 88-page illustrated text. It fully describes Cold Roll Forming Equipment, processes and products.



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5510 Walworth Ave. • Cleveland 2, Ohio

ENGINEERING
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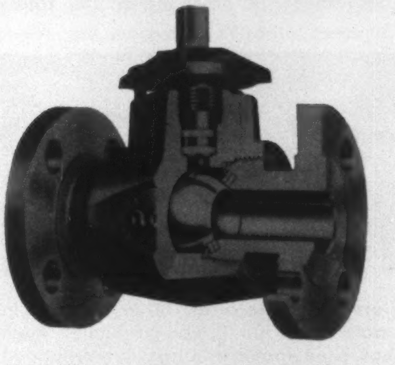
W-K-M's ACF Ball Valves...

LEAKPROOF AFTER 600,000 CYCLES!



Proved in the laboratory, and in over five years of field service with such difficult ladings as acetone, propane, vinyl chloride, and lime and soda-ash slurry, W-K-M's ACF Ball Valve has earned a reputation for extra long life *without lubrication.* For example —

In one test, W-K-M opened and closed a 2″ standard production model under pressure 600,000 times. The valve still sealed tight, and there was no measurable wear on either the chrome-plated ball or the Teflon seats!

W-K-M's rugged ACF Ball Valves are available in carbon steel to ASA 300 lbs. (some sizes 600 lbs.), and in semi-steel, ASA 200 and 400 lbs. WOG.

Write for Catalog 1000.

Conduit is full-bore; Teflon stem gaskets and seats are sealed from the lading flow.

WHEN SO MUCH DEPENDS ON A VALVE . . . SPECIFY ACF BALL VALVES

W-K-M

DIVISION OF ACF INDUSTRIES
INCORPORATED
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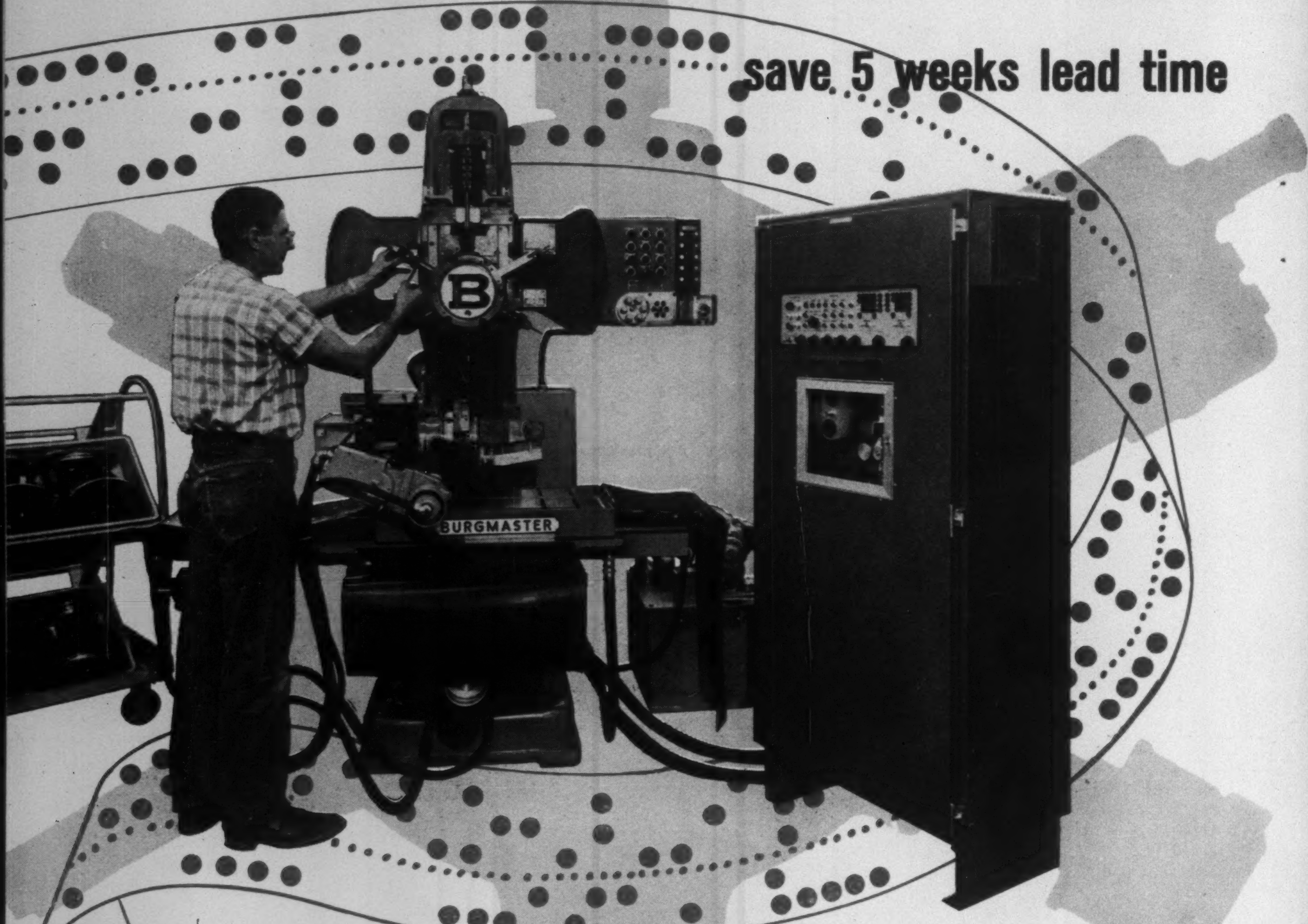
REDUCE TOOL COSTS $3000

save 5 weeks lead time



Burgmaster Model 2BHT 6-Spindle Turret Drilling, Tapping and Boring Machine equipped with Hughes 2-Axis Numerical Controls. X-Y axis controls table motion and machining of holes in flat plane. In this setup, a third motion controls the rotary fixture to automatically machine all radial holes. This is accomplished by a switching device on the Control Panel converting "Y" information to rotary information.

Rocket Bulk Head is completely drilled, countersunk and tapped on Burgmaster Tape Controlled Turret Drill without jigs or drill bushings. 16 tools are used to machine 69 holes.

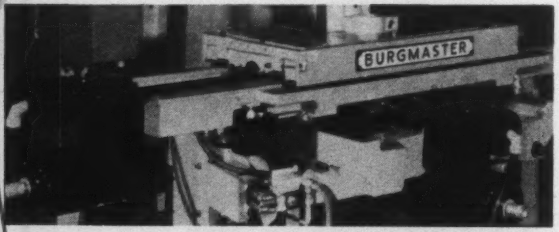


Table Servo-Motors position table at 180 in./min. within ±.0005", repeatable to ±.0002", non-cumulative. Each axis of table motion is equipped with heavily pre-loaded ball bearing lead screws and anti-backlash ball nuts. Automatic clamps lock table into a rigid unit during machining.

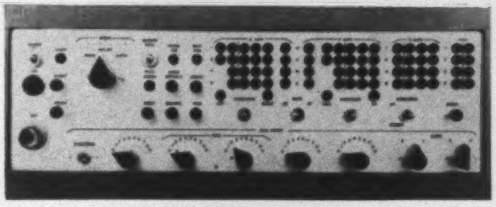
ON ROCKET PART

at Hughes Aircraft Company

Hughes Aircraft, Tucson, Arizona, use a Burgmaster 6-Spindle Turret Drilling, Tapping and Boring Machine equipped with 2-axis Tape Controls for controlling X, Y, and rotary motions to materially streamline production of small lots. Typical savings are shown in drilling, countersinking and tapping 69 holes in a lot of 50 cast iron Rocket Bulk Heads. Due to the fully automatic action of the tape controlled Burgmaster Turret Drill, expensive jigs and fixtures are eliminated — reducing tool costs $3000 — while saving 5 weeks lead time getting the job into production.

This is maximum flexible automation. Fully automatic machining is carried out in accordance with the commands of an easy-to-prepare tape performing any combination of six operations without tool changing. Individual preselective spindle speeds and feeds assure each operation is done at optimum tool efficiency for fine finish, precision, speed and long tool life. Engineering changes involving revision of machining can be done quickly by simple tape modification.

BURGMASTER



Hughes 2-Axis Tape Control Panel mounted at eye level on the Control Cabinet is provided with display lights that show accuracy of programming at a glance. This 2-axis system automatically controls positioning of the Burgmaster machine table on the X-Y axis simultaneously and directs the "third" axis when needed. A third axis of control may be added to the system to govern individual spindle depths, thus eliminating manual setting of the standard machine depth stops; or control special indexing fixtures with ±0° 03' for automatic location and machining of radial holes, etc. Operator can dial dimensional commands directly into panel for any axis.

Job Facts

Company: Hughes Aircraft Company, Tucson, Arizona

Machine: Burgmaster Model 2BHT-L 6-Spindle Turret Drilling, Tapping and Moring Machine equipped with Hughes 2-Axis Numerical Controls.

Part: Cast Iron Rocket Bulk Head.

Quantity: 50 parts.

Holding: Flat Plane Holes — Simple Adapter Plate; Radial Holes — Special Vertical Rotary Fixture controlled by "Z" axis.

Accuracy: Flat Plane Holes — ±.0005" hole centers; Radial Holes— ±0° 03'

Savings: $3000 tool costs; 5 weeks lead time.

Other Advantages: Fewer rejects due to elimination of human factor; less inspection; reduced floor space required; much faster engineering changes; economical production of small lots; less tool changing; less work movement.

ALL LEADING STANDARD MAKES of Numerical Controls are available in Burgmaster Tape Controlled Turret Drills at Customer's preference. Write for literature describing 6 and 8 spindle machines with complete specifications and features. Twenty minute 16mm sound film showing Burgmaster turret drills in operations, including, the new automatic positioning table, available from any office.

World's Largest Builder of Turret Drilling Machines

"O" Manual Power Index ¼" Capacity

1C Manual Power Index ⅜" Capacity

2B Manual Power Index ¾" Capacity

2BR Ram Type Radial Drill ¾" Capacity

2BH Automatic Hydraulic ¾" Capacity

3BH Automatic Hydraulic 1½" Capacity

2SAH Automatic Tape Controlled 1¼" Capacity

2BHT-3BHT Automatic Tape Controlled ¾" and 1½" Capacity

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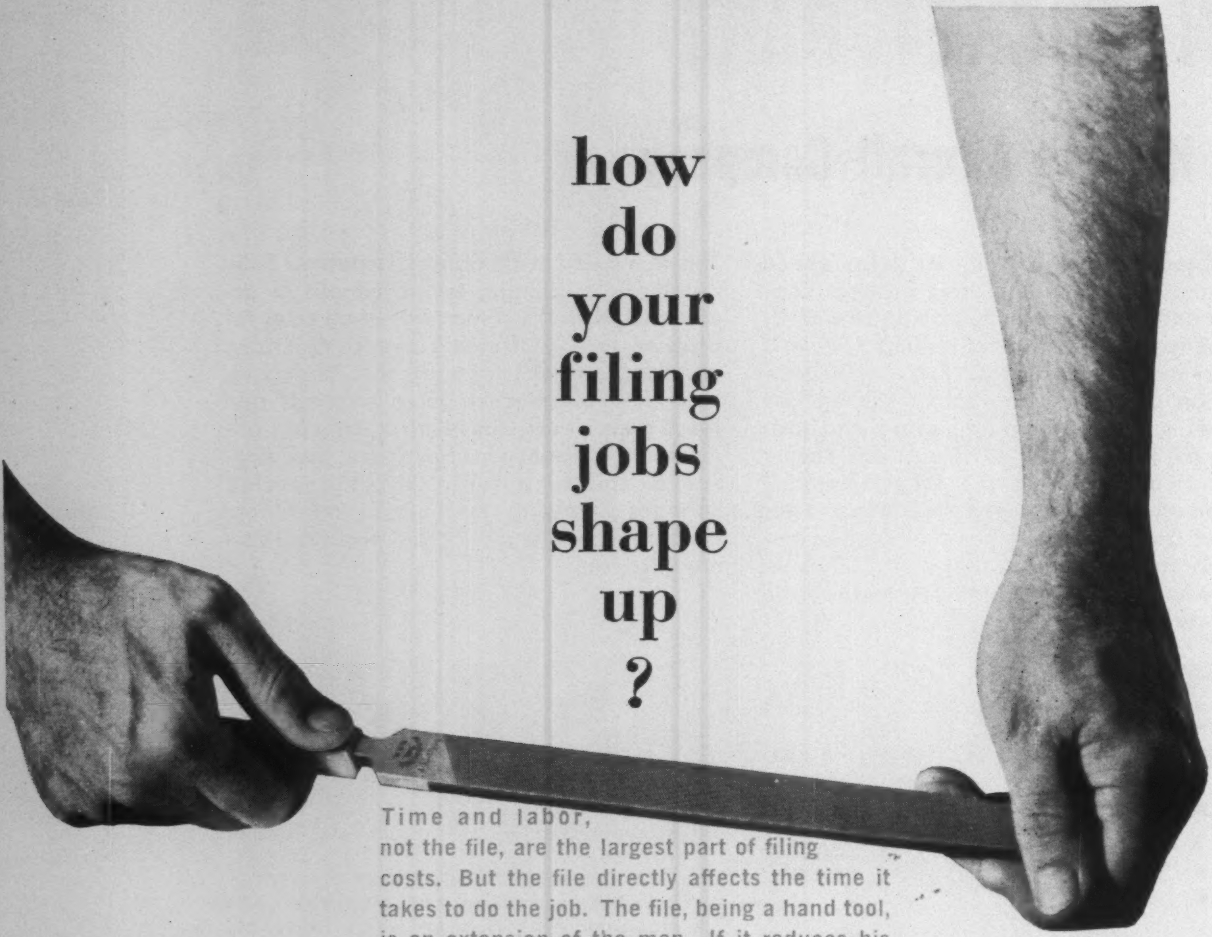
Plus dealer representatives in other industrial centers.



how
do
your
filing
jobs
shape
up
?

Time and labor, not the file, are the largest part of filing costs. But the file directly affects the time it takes to do the job. The file, being a hand tool, is an extension of the man. If it reduces his skill, the work suffers and costs go up. But if the file matches a worker's skill, he becomes more productive and therefore, costs go down. Nicholson and Black Diamond files are preferred by the majority of industrial purchasers. They're top quality to produce a quality job. They match a worker's skill. There are 6000 different types, shapes and sizes . . . one that's precisely right for your job. And they wear well, thereby reducing your tool replacement costs. Your Nicholson or Black Diamond Distributor* will be glad to help you with your filing problems, help select the right file for your job.

* Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.

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NICHOLSON FILE COMPANY, PROVIDENCE 1, RHODE ISLAND

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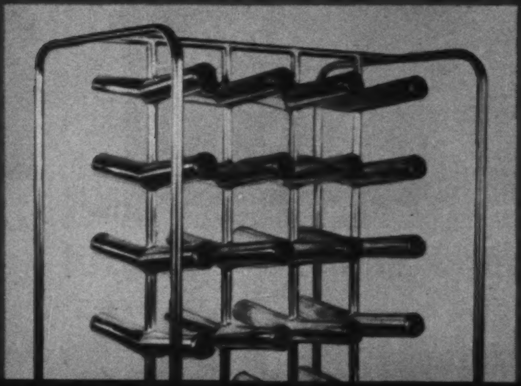
you can form it...

you can weld it...



but you can never, no never, change its **consistent uniformity!**

...no matter what test you put it to, you'll get consistent performance, greater output, better quality and more profit with Carpenter Specialty Stainless...produced by one of the leaders of stainless steels for industry.

Carpenter steel

you can do it ***consistently*** better with Carpenter Stainless Steels for specialists

Stainless Steel

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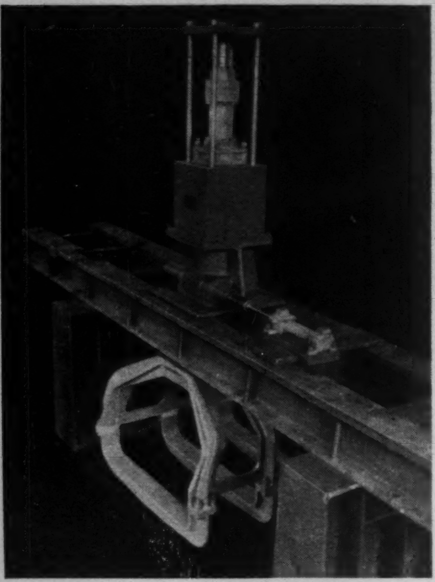
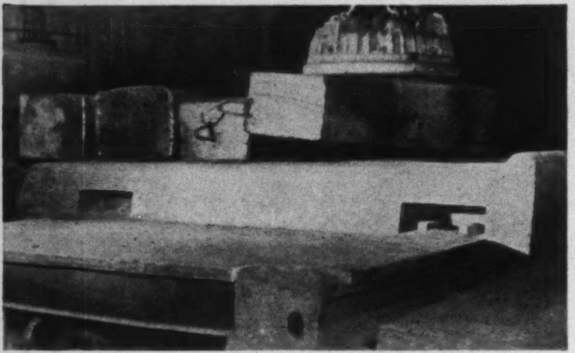
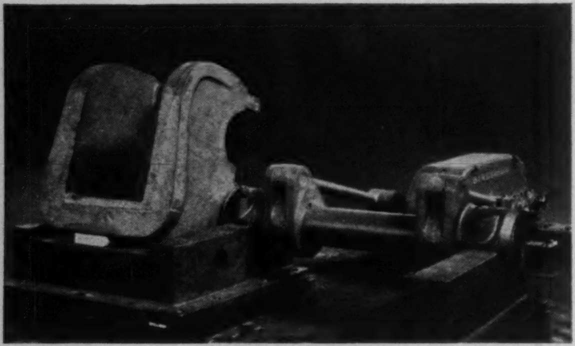
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.



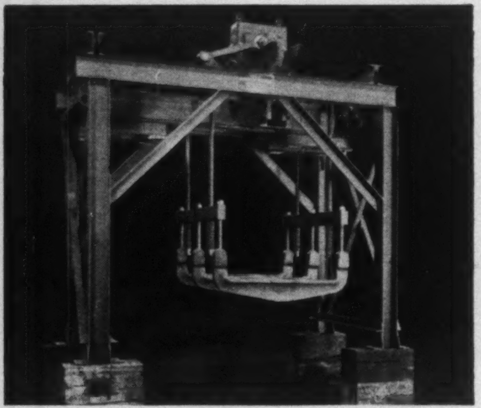
Ingot Turn-about arranged for mounting over mill approach table.



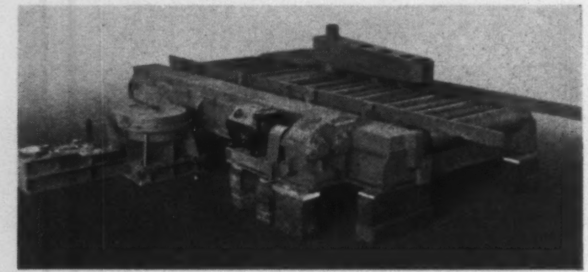
Ingot feeder bed and chain conveyor, receives ingots from crane and feeds up slope to ingot furnace charging table and pushers.



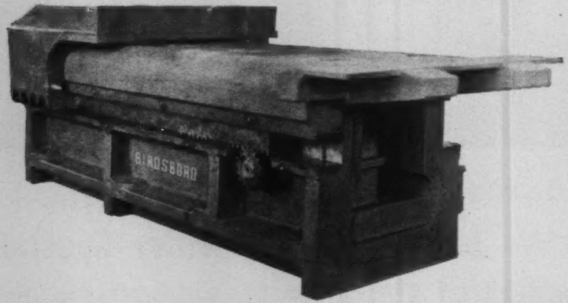
Stationary ingot tilting pot for receiving ingots from crane and laying them on mill approach table.



Ingot weighing scale arranged for mounting over mill approach table.



Ingot receiving table and sweep arm arranged to receive ingots from tilting pot buggy and to place them either end first on mill approach table.



Ingot pusher to mill approach table arranged to receive ingots from pit crane.

Ingot Weighing and Handling Equipment by

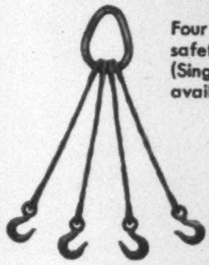
MM 87-60

BIRDSBORO

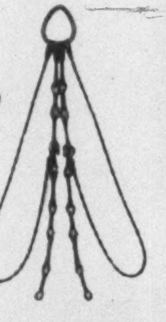
CORPORATION

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS
ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL • BIRDSBORO, PENNSYLVANIA

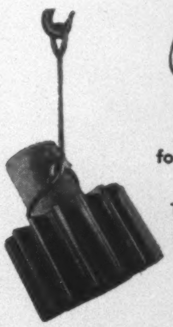
HERE ARE JUST A FEW YELLOW STRAND BRAIDED SAFETY SLINGS DESIGNED SPECIFICALLY FOR MATERIALS HANDLING:



Four leg braided safety slings. (Single, 2 or 3 legs available.)



Adjustable slings for crate handling.



The ever popular MS-1 with sliding choker hook.

Yellow Strand Braided Safety Slings are available in practically any length and number of parts with scores of different fittings.

Handle any size, shape, weight of lift with maximum safety and ease

Highly machined parts, any size, weight or shape — massive castings and assemblies weighing hundreds of tons: you name your materials handling problem — your Broderick & Bascom Sling Specialist has the answer. Yellow Strand Braided Safety Slings!

These are extremely flexible slings with the strength of Yellow Strand and flexibility comparable to manila rope. For special requirements they are available with high strength "POWERSTEEL."

Most important, Yellow Strand Braided Safety Slings can be economically designed for your specific application by B & B Sling Specialists, and built by skilled master craftsmen.

For an analysis of your needs — for an extra margin of confidence, call our nearest branch, or our Engineering Department. *Broderick & Bascom Rope Co., 4203 Union Boulevard, St. Louis 15, Mo.*

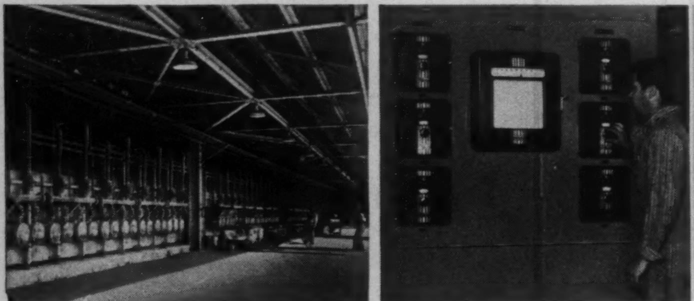
Yellow Strand®

BRAIDED SAFETY SLINGS

Alabama Metallurgical Corp., Selma, Ala.: High-purity magnesium ingots ready for shipment; ALAMET also produces commercial and alloy grades.

L&N control facilitates magnesium reduction...

. . . at Alabama Metallurgical Corp., Selma, Ala., where thirty Electromax® controllers helped them swing into full production after only a few months of operation. Magnesium at this new plant is produced from briquettes of CaO, MgO, $FeSi$ and CaF_2 which are reduced at 2150 F in evacuated retorts. Since startup in late 1959, Electromax has been consistently holding retort temperatures within ± 5 F. Additional instrumentation includes Speedomax® H which is recording flue and feed-zone temperatures of the lime burner kiln, and controlling temperatures of magnesium bath for casting into ingot and pig. You'll find L&N instruments providing equally dependable control for thousands of applications where heat is used . . . helping to produce both process economies and a quality product. When such significant savings stem from such a modest investment, *it pays to get the best.* For details about L&N controls for modernization or expansion, contact your nearest L&N office or write 4956 Stenton Ave., Phila. 44, Pa.



With Electromax holding retort temperatures within ± 5 F, Speedomax G multiple-point recorders provide a permanent record of furnace temperatures.

LEEDS NORTHRUP
Instruments Automatic Controls • Furnaces

STEELMAKING AT JESSOP

175,000 pounds x 150 mph = shock treatment

The powerful jet engines whine in reduced-throttle restraint as the big, sleek aircraft maneuvers gracefully in its approach pattern.

In the cockpit, the crew goes through a check list. At one point the wheels are lowered and three green lights appear, indicating the gear is in position.

Then, a moment later, the pilot eases the 175,000 pound aircraft traveling 150 miles per hour onto the concrete—safely, surely, with confidence.

Probably, the steel in the landing gear was forged by Steel Improvement & Forge Company of Cleveland. For those components that bear the brunt of the impact, Steel Improvement purchases a Macro-Clean alloy made exclusively by Jessop at its Green River plant.

Only Jessop has it, this tough, sound-centered Macro-Clean alloy that takes in stride the transverse shock imposed on aircraft landing gear.

And the excellent physical properties inherent in Macro-Clean alloys make them ideally suited for numerous other applications too—crankshafts, gears of all kinds, pellet mills, driveshafts, large bearings and oil field goods for example.

Call any of Jessop's 23 sales offices in North America for Macro-Clean aircraft and forging quality alloys and a full range of specialty steels.

Jessop Steel Company
Washington, Pennsylvania

Plants and Service Centers:
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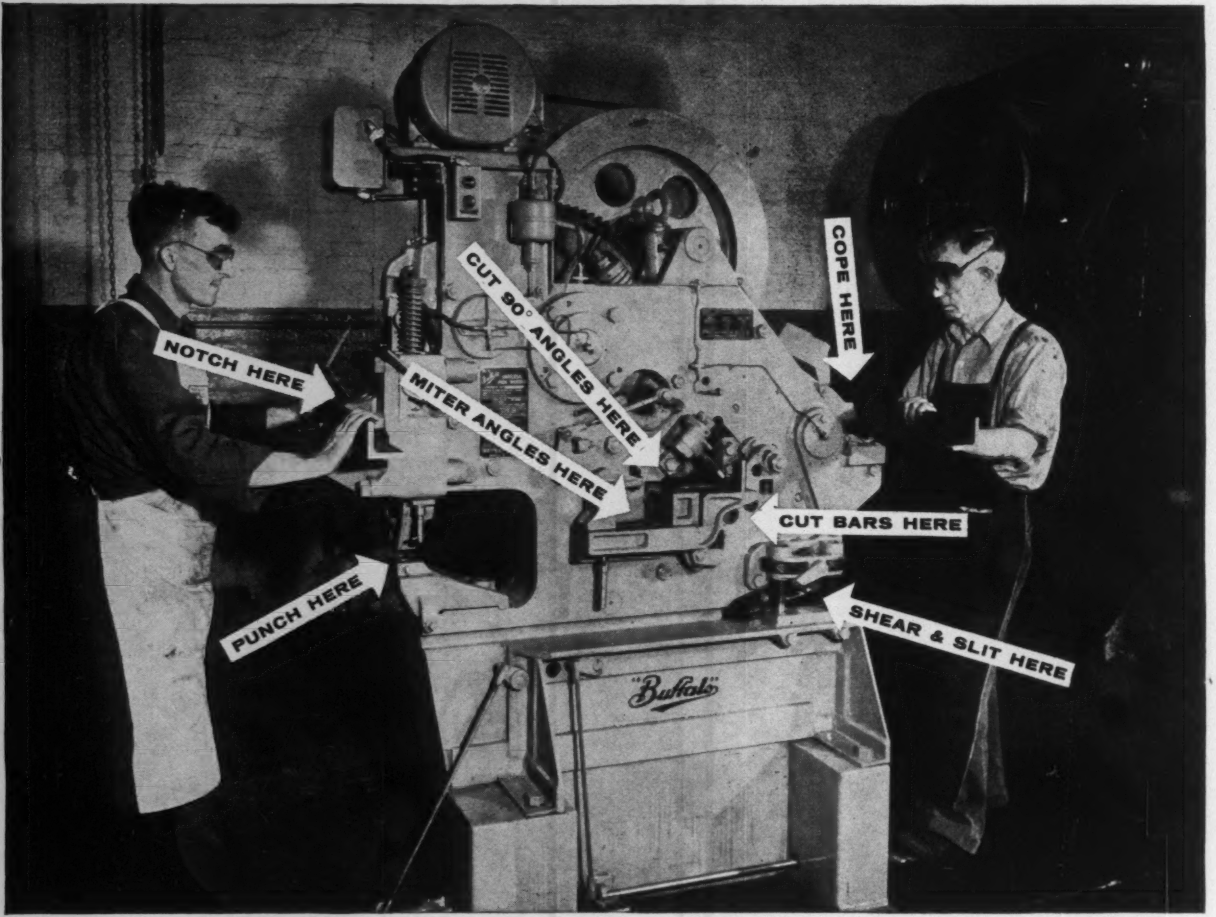
JESSOP



SEVEN OPERATIONS—SAME MACHINE

SAVES ON MAINTENANCE AND PRODUCTION

A BUFFALO Iron Worker can be the most useful, productive and cost-saving machine in your shop.

Without changing tools, it will do a variety of jobs — **several at the same time.**

It's compact, ruggedly-built, requires practically no maintenance and is available in your choice of sizes and models.

Worth investigating, a BUFFALO U. I. W. pays its own way and returns dividends. Maybe you can't afford to be without one. Write for Bulletin 322 or . . . better still . . . call in your nearest BUFFALO representative.

"Buffalo"

BUFFALO FORGE COMPANY
Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

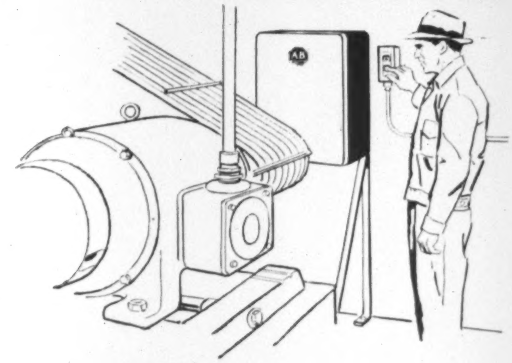
Buffalo air handling equipment to move, heat, cool, dehumidify and clean air and other gases.

Buffalo Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

Buffalo Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

You're better off with Buffalo Machine Tools to Drill, Punch, Shear or Bend.

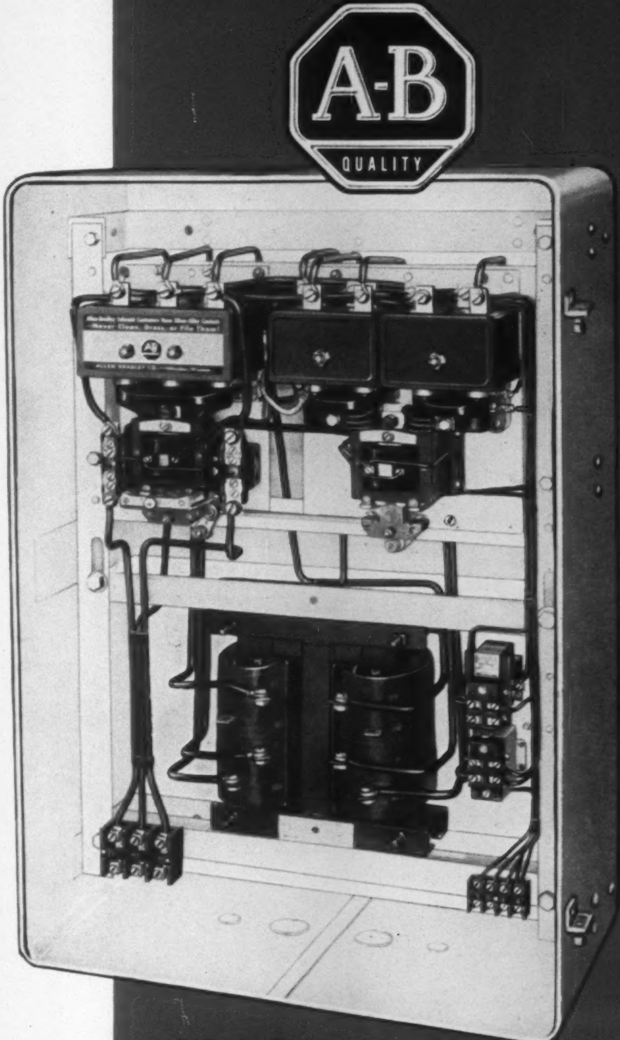


WHEN REDUCED VOLTAGE STARTING IS A MUST

Only Allen-Bradley can provide all the answers

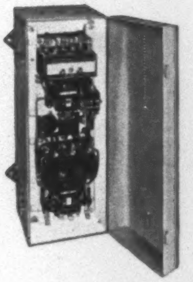
The Allen-Bradley line of reduced voltage starters makes possible a selection of the best starter, not only to meet the power company's requirements but also to provide the best starting conditions for the motor and the "load" that it drives.

The simple solenoid contactors in A-B reduced voltage starters have only ONE moving part—assuring millions of trouble free operations. And their double break, silver alloy contacts never need costly maintenance. Accurate, reliable overload relays protect motors against burnouts. Write for Publication 6088.



Bulletin 746

Automatic reduced voltage starter for squirrel cage motors that should not be started on full line voltage. It employs autotransformer connected in open delta to reduce line voltage during starting. Adjustable timing relay controls starting period. Taps are provided on the autotransformer to adjust the starting voltage applied to the motor. Ratings to 300 hp, 220 v; 600 hp, 440-550 v.

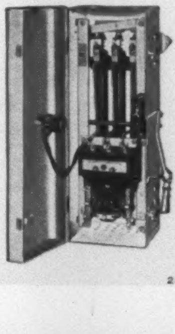


Bulletin 740

Graphite disc resistors are automatically inserted in series with the squirrel cage motor at starting, and they are automatically cut out after a predetermined time. Turning a single screw on the starter frame adjusts the compression resistors exactly to motor and load conditions for velvet smooth acceleration. Ratings to 200 hp, 220-440-550 v.

Bulletin 640

Where remote control is not needed, these graphite compression disc resistor starters provide stepless acceleration of squirrel cage motors. Operated by hand lever, the smooth starting of the motor is under the control of the operator. No-voltage and dependable overload protection is provided. Ratings to 200 hp, 220-440-550 v.



26-60-R

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

A-B
QUALITY

ALLEN-BRADLEY
Solenoid Starters give

MORE MILLIONS OF TROUBLE FREE OPERATIONS

... and for good reasons

- **ONE MOVING PART**

  With this simple solenoid design, there's virtually nothing to go wrong—all trouble-causing bearings, pivots, and flexible jumpers have been eliminated.

- **DOUBLE BREAK, SILVER ALLOY CONTACTS**

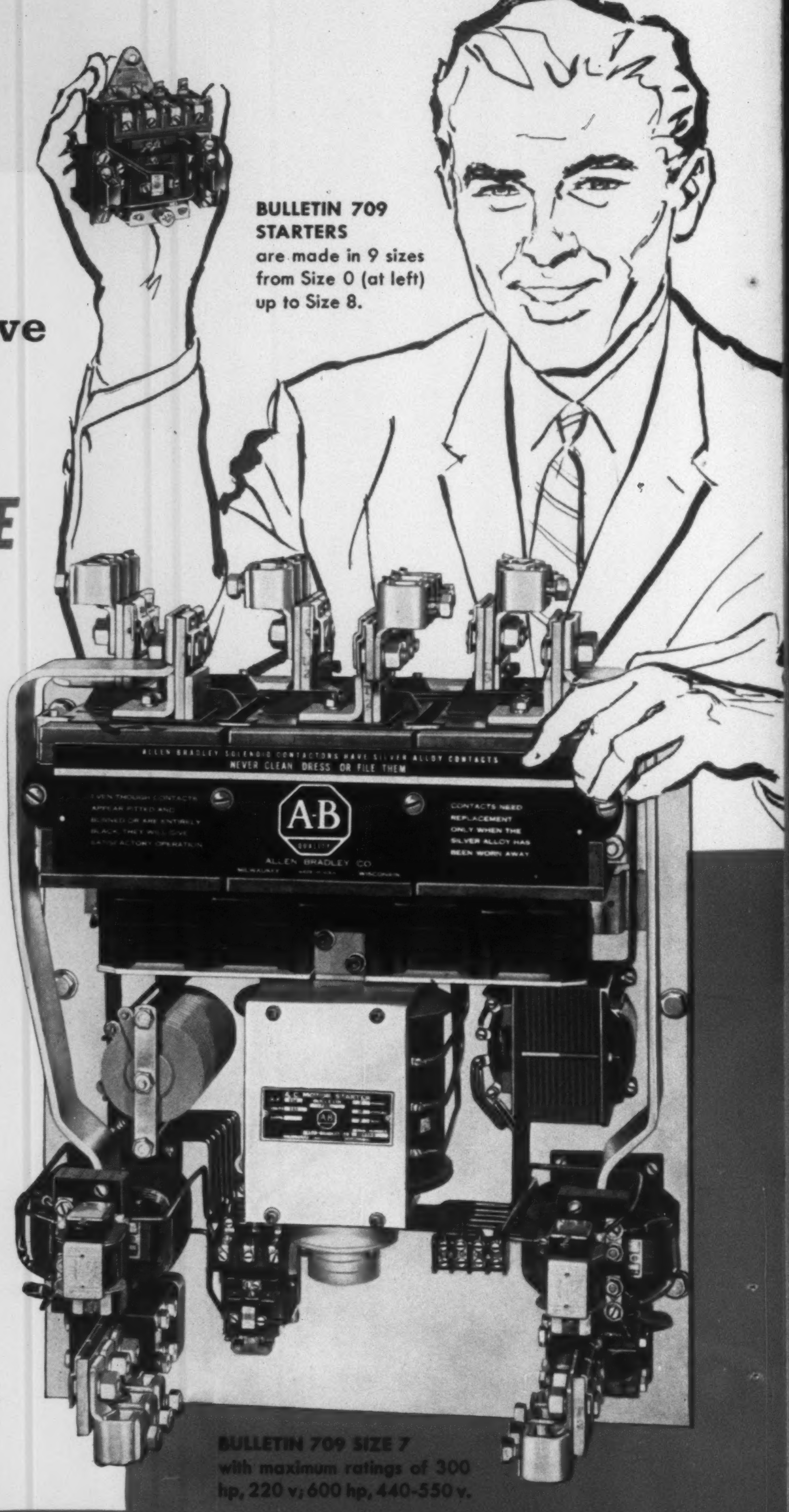
  Allen-Bradley silver alloy contacts never require maintenance. They are always in perfect operating condition . . . and remain so until completely worn away.

- **SIMPLE UP-AND-DOWN MOTION**

  The virtually frictionless, straight line vertical motion provides uniform contact pressure at all times—and assures consistent, rapid operation of the contactor.

- **RELIABLE OVERLOAD PROTECTION**

  All A-B starters are equipped with two permanently accurate and reliable overload relays that protect motors against "burnouts." Three overload relays can be furnished.


ALLEN BRADLEY SOLENOID CONTACTORS HAVE SILVER ALLOY CONTACTS
NEVER CLEAN DRESS OR FILE THEM
EVEN THOUGH CONTACTS APPEAR PITTED AND BURNED OR ARE ENTIRELY BLACK THEY WILL GIVE SATISFACTORY OPERATION
A-B
QUALITY
ALLEN BRADLEY CO
CONTACTS NEED REPLACEMENT ONLY WHEN THE SILVER ALLOY HAS BEEN WORN AWAY

BULLETIN 709 STARTERS
are made in 9 sizes from Size 0 (at left) up to Size 8.

BULLETIN 709 SIZE 7
with maximum ratings of 300 hp, 220 v; 600 hp, 440-550 v.

ALLEN-BRADLEY

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Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

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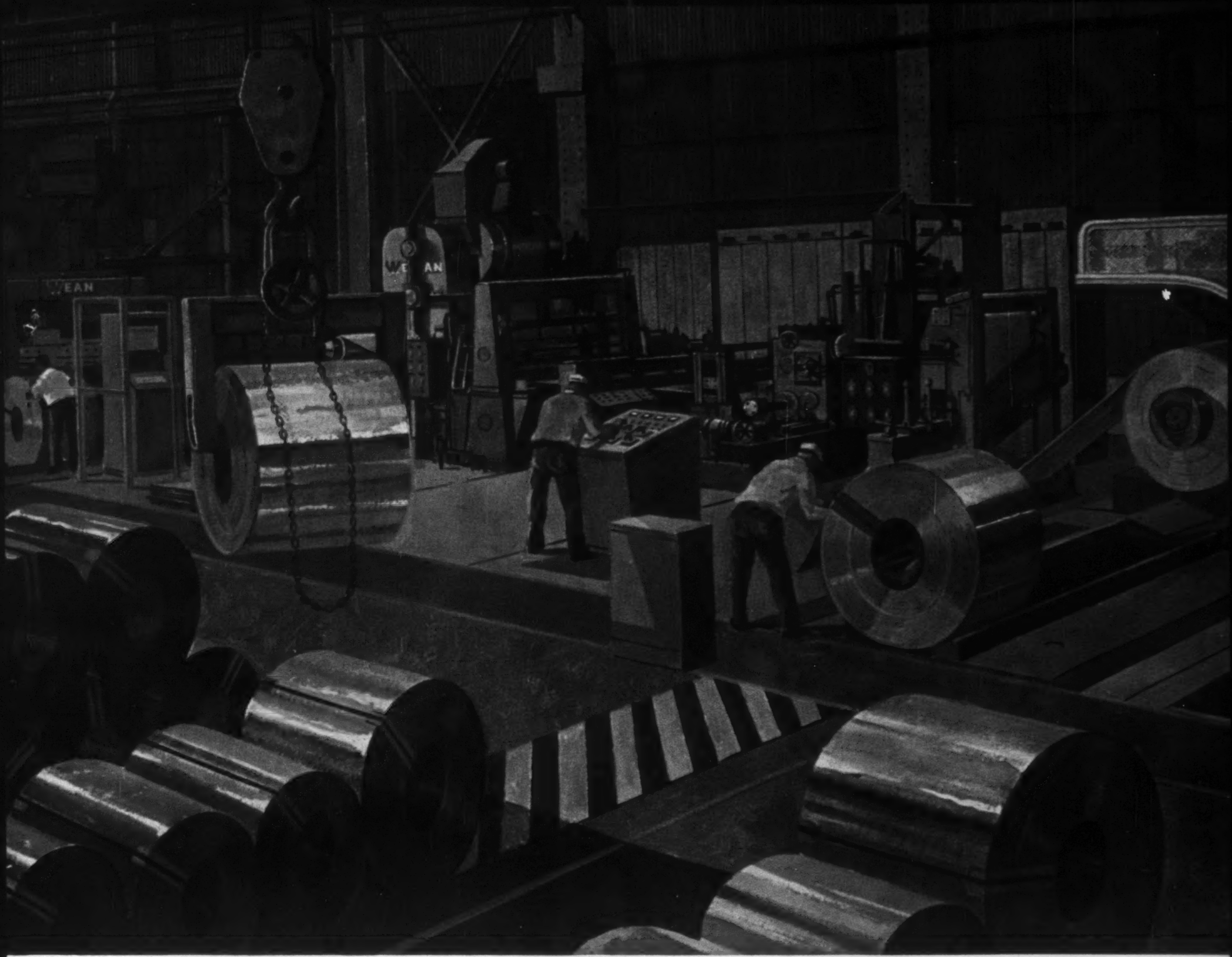


No. 3 Coil Preparation Line At Wheeling Steel Corporation's Yorkville Plant

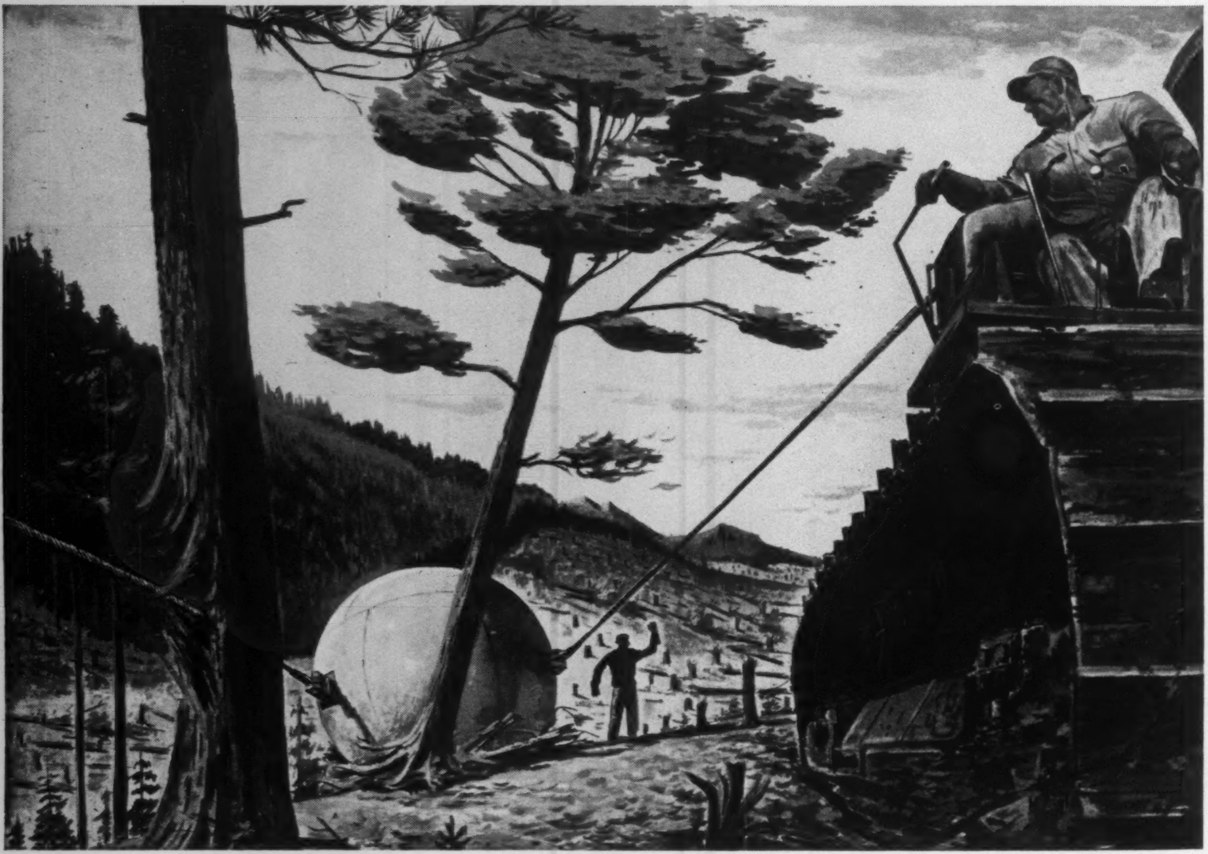
Wean, Wheeling and Coil Preparation . . .

Inspecting and side trimming coils at high speeds, this Wean coil preparation line at Wheeling Steel Corporation represents another advance in the development of high speed processing lines. This new Wean line is designed to produce oiled black plate, or to prepare coils of various gauges for tinning and galvanizing. Capable of handling coil weights up to 42,000 pounds, the No. 3 Yorkville line can side-trim strip up to 45 inches in width and from .006 to .0359 in thickness.

Other new features of the Yorkville line are a butt-type shear-welder that produces a very smooth joint, minimizing distortion in the wraps of built-up coils; and a non-contact thickness gauge with indicating and recording instruments.

Wean's "creative engineering" has developed modern coil preparation lines that offer speeds of over 4,000 fpm, increased efficiency and higher prime product yield in subsequent coating operations. Wean experience in this field can be a valuable asset if coil preparation lines are part of your production planning.

THE WEAN ENGINEERING COMPANY • WARREN • OHIO



PAUL BUNYAN'S BOWLING BALL PROVES BEARINGS!

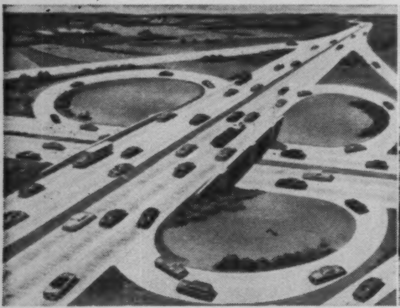
This game of tenpins would have been fine sport for Paul Bunyan, yet it would have taxed even *his* strength to clear as much as 50 acres an hour with this gigantic ball. Today, giant 'dozers do the job with ease. Nearly every leading make is equipped with Bower Straight and Tapered Roller Bearings – with proven ability to stand up under back-breaking pressure. Manufacturers look to Bower for improved bearing design and painstaking quality control that make Bower bearings last longer, need less maintenance. When you require bearings, select from Bower's complete line of tapered, straight and journal roller bearings for every field of transportation and industry. Bower Roller Bearing Division, Detroit 14, Michigan.

BOWER
ROLLER BEARINGS

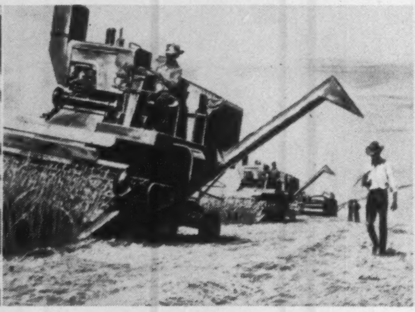
tapered
cylindrical
journal

DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.

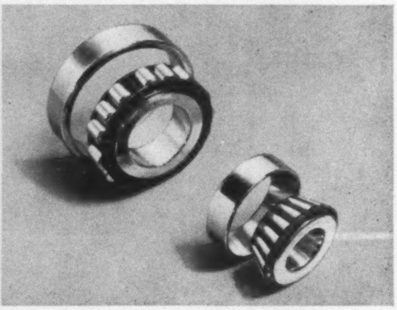
AUTOMOTIVE. Bower roller bearings are designed and constructed to stand up indefinitely with little or no attention.



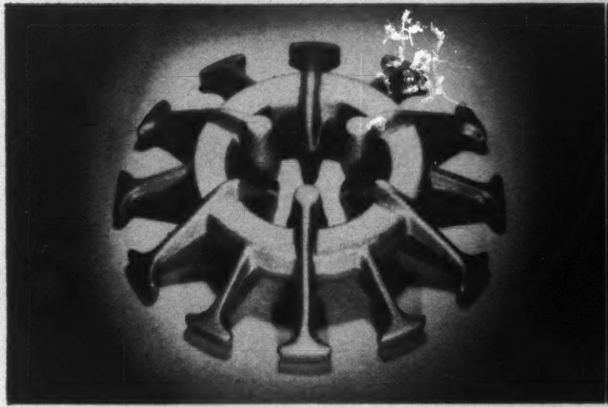
AGRICULTURE. Breakdowns in equipment are costly. That's why farm equipment makers use Bower roller bearings.

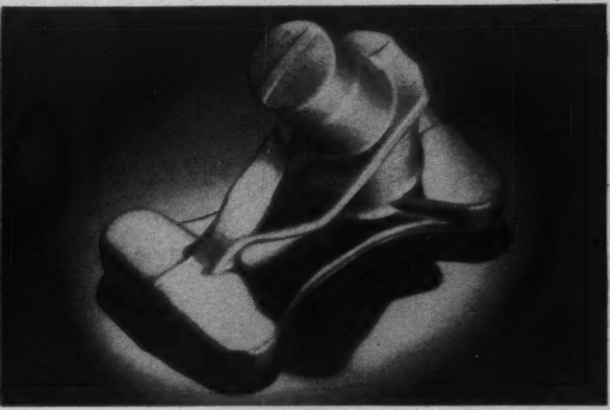


BOWER'S BROAD LINE of tapered, cylindrical and journal roller bearings are used in virtually every industry.



IF IT'S FORGEABLE...
Get a Quote from WILLIAMS


Forged, trimmed, punched, shot blasted and coined


Forged, trimmed and shot blasted

COMPLETE FORGING SERVICE FROM DESIGN TO FINISHED PART

METALS

Ferrous Metals
- Carbon Steels
- Alloy Steels
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Non Ferrous Metals
- Aluminum Alloys
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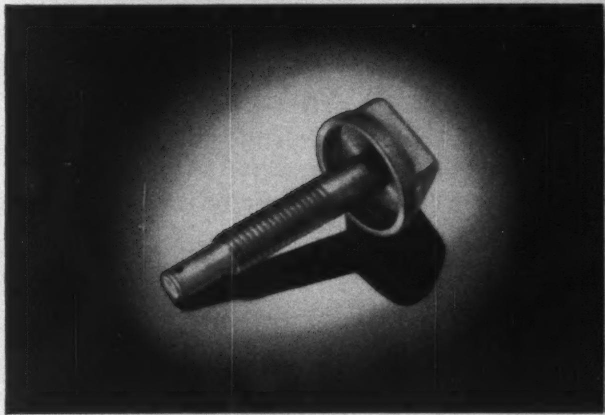
- Monel
- Titanium

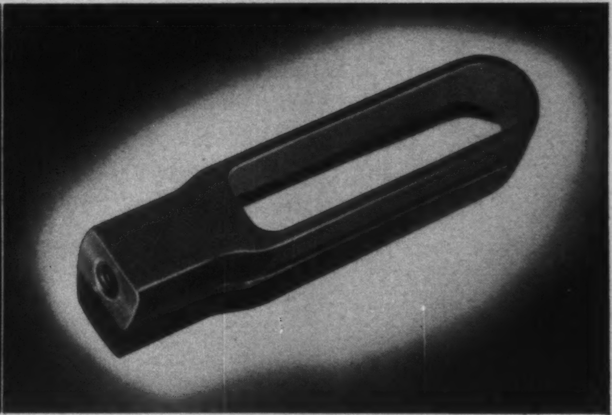
FORGING METHODS
- Drop-Hammer
- Steam Hammer
- Mechanical Press
- Upsetting
- Coining
- Restriking
- Open-Frame Hammer

CLEANING METHODS
- Pickling
- Shot Blasting
- Grit Blasting
- Tumbling

HEAT TREATMENT
- Normalizing
- Annealing
- Spheroidizing
- Hardening
- Tempering
- Stress Relieving
- Austempering
- Pack Carburizing
- Liquid Carburizing
- Solution Treating
- Precipitation Treating

FINISHING OPERATIONS
- Broaching
- Milling
- Drilling
- Tapping
- Threading
- Turning
- Coining
- Grinding, Polishing
- Chrome-Plating
- Cadmium Plating
- Black Oxidizing
- Spray Painting


Forged, trimmed, shot blasted, turned, drilled, threaded and cadmium plated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WILLIAMS PRECISION FORGINGS

10 DAY QUOTATION SERVICE—Under normal conditions, quotations are mailed in 10 days or less from receipt of inquiry, provided all necessary information is furnished.

J. H. WILLIAMS & CO.
DIVISION OF UNITED-GREENFIELD CORPORATION
407 VULCAN STREET • BUFFALO 7, N. Y.

Please send your new Forging Design Manual No. 60 which includes all necessary design data—tolerance tables, standard practices, specifications, etc.

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CITY________ ZONE____ STATE______

MAGNETHERMIC
AJAX ELECTROTHERMIC
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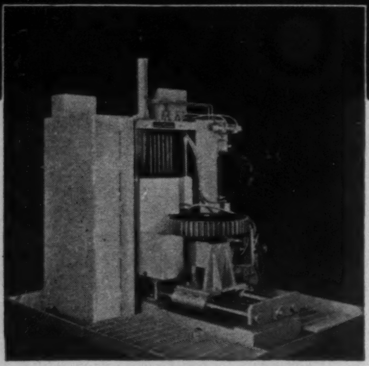
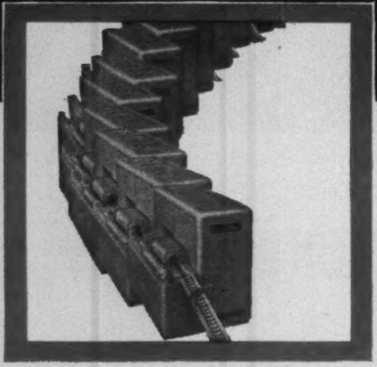
we like to be close to our customers...

and future customers!

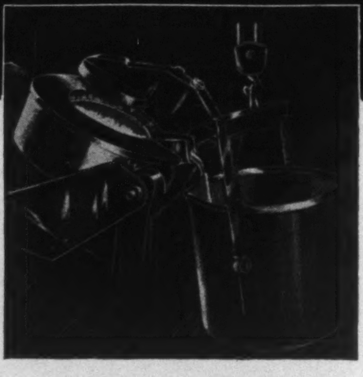
Ajax Magnethermic Representatives are located in major market areas. You will find the telephone number of the office in your area on the opposite page. Whether you want information on an application, or service on an existing installation, the Ajax Magnethermic man can give you assistance. He knows induction heating and melting.



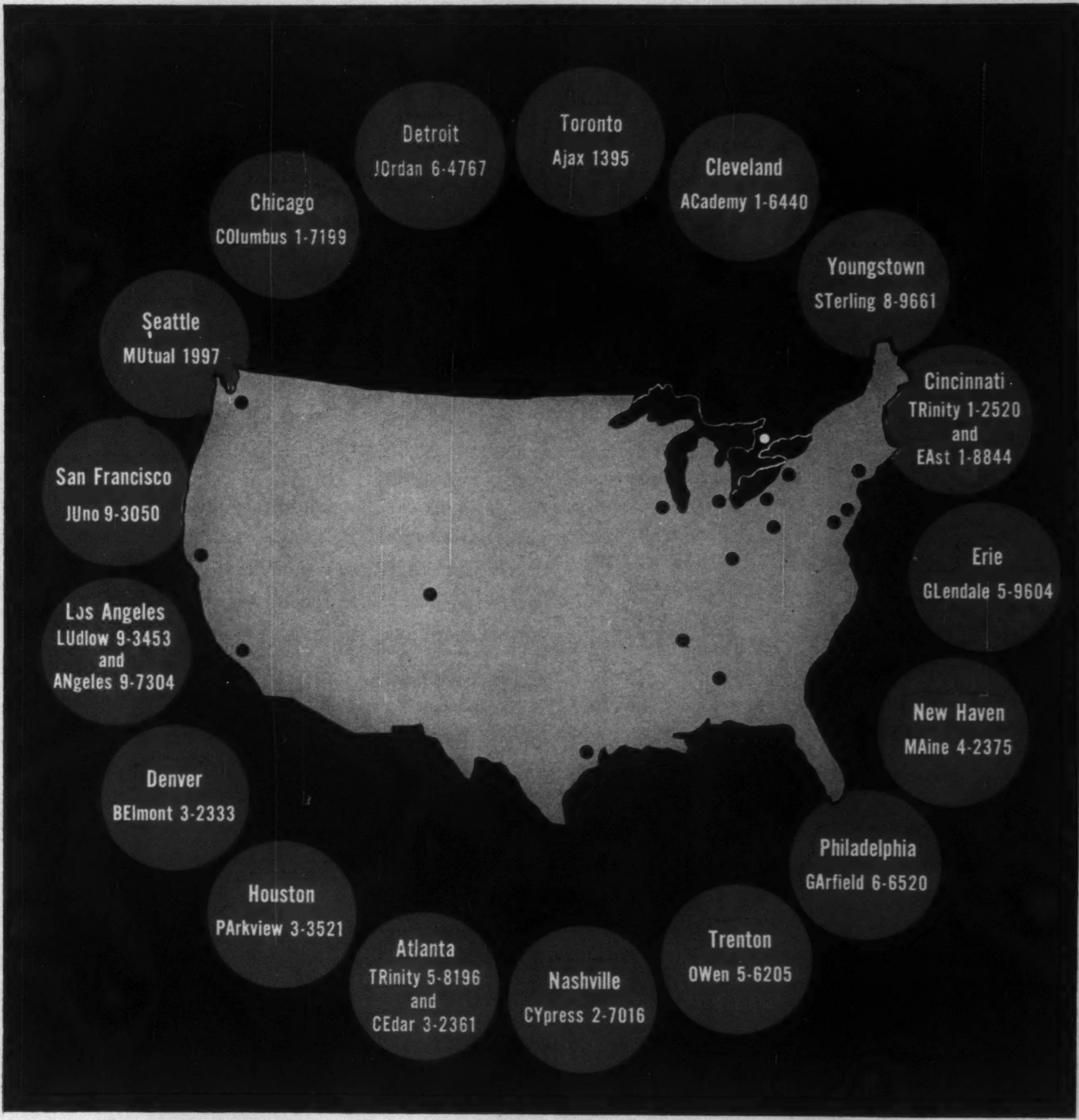
HEAT TREATING . . . AM makes Induction heat treating equipment for either high production or job shop operation. Shown above—the versatile gear hardener . . . heat treats 6" to 60" diameter gears.



BILLET HEATING . . . Press the button, that's all! The AM Billet Heater delivers a billet at exact temperature to the extrusion or forging press.



MELTING . . . AM supplies all types of Induction Melting Furnaces including: core, coreless, lift and automatic pouring, vacuum and degassing.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OWen 5-6205
Nashville
CYpress 2-7016
Atlanta
TRinity 5-8196
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induction heating is our only business!

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At Seaway, rolling schedules are geared and adjustable to provide the greatest possible degree of FLEXIBILITY for our customers. We can produce any size rod or bar and under normal conditions, PRODUCE IT FASTER.

Quality — Forging and Cold Heading.

Special Analysis • *Special Surface Finishes*
Special Hardness • *Special Heat Treating*

At Seaway, every order regardless of size gets the same special attention and accommodative service.

Ask us about a delivery date on your next order

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SEAWAY STEEL CORPORATION
101 EAST AVENUE • NORTH TONAWANDA, NEW YORK

MARKET-PLANNING DIGEST

PURCHASING AGENTS STRIKE HARD NOTE ON PRICES AND INVENTORIES in October survey of National Assn. of Purchasing Agents. More than 80 pct think prices are high, despite some softening. Says the report; "There will be little acceptance . . . of any price increases in the near future." Most PA's also feel inventories are higher than required for present business levels.

IF YOU SELL TO THE AUTOMAKERS look for new stress on reliability. A leading steelmaker says the extension of new car warranties will result in more customer complaints. These will be tracked down to offending parts, and reliability ratings will be set up for parts and materials suppliers. Lower rated suppliers will have their share of the business cut down.

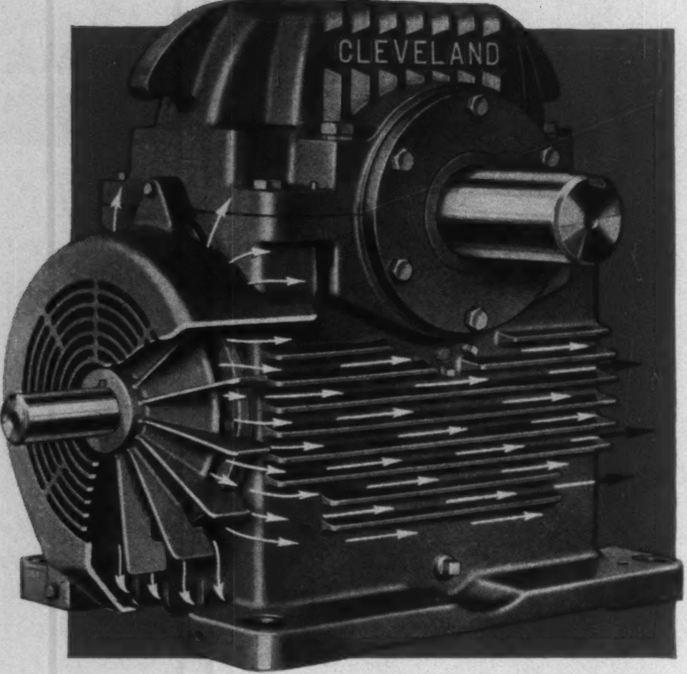
ELECTRONICS IS AN ACTIVE MARKET now as this group is already profiting by stepped-up defense business. Further, consumer electronic sales are running over last year's levels. And one of the big selling seasons, November-December, is just opening up.

MACHINE TOOL BUILDERS expect fourth quarter business to be the best the industry has had "in a long time." Alan C. Mattison, president of the National Machine Tool Builders' Assn., says industry must cut costs, and "we have what it takes to meet that need."

A LONG LOOK AT PLANNED OBSOLESCENCE IS NEEDED, according to U. of Penn. marketing professor, Reavis Cox. He finds "very little valid information" on the hotly-debated subject. He thinks marketers should find out how many companies engage in it, how many and what products are discarded, what becomes of the materials in them, and whether P.O. is really wasteful.

CONSTRUCTION EXPENDITURES HOLD FIRM as the value of total new construction put-in-place in October amounted to $5.1 billion. This was 3 pct less than September, a normal seasonal change, and about the same as in October 1959. Expenditures for first 10 months of 1960 were 2 pct less than the same period in 1959.

A SLOWDOWN IN AUTO PRODUCTION in November is probable. Production of 1961 model cars went over 1 million the last week in October --a month faster than for 1960 models. Many automakers have reduced overtime plans for November. Less than 15 pct of U.S. car assembly plants plan Saturday operations this month.



Fan cooling for Increased HP Capacity is Not New . . . *to users of Cleveland Speed Reducers*

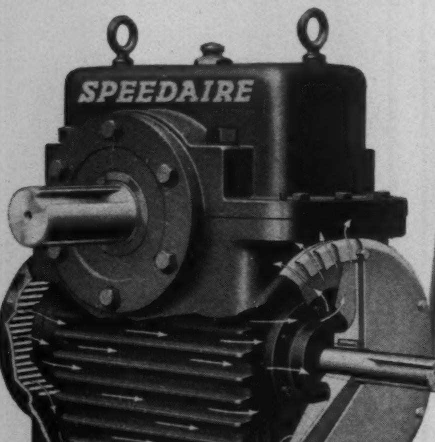
As far back as 1944, Cleveland Speedaire Worm Gear Reducers (shown in both the announcement ad and cutaway photo below) were providing industry twice the load carrying capacity then available from standard worm gear units of equal frame size. Even then, it was *fan cooling* that did the trick—because fan cooling was and still is the most practical method of heat dissipation.

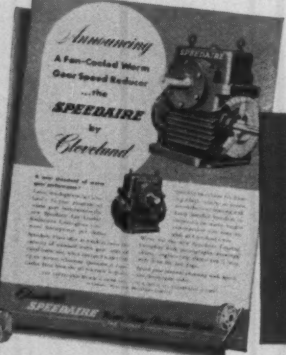
On the new, higher horsepower Cleveland's (shown in top cutaway photo), a small, specially designed fan—equally effective in either direction of rotation—is located on the worm shaft's input side. Fan size and design permit a smooth, more effective flow of air beneath, above, and around all sides of the reducer.

Mounting the cooling fan on the WORM shaft input end is a very definite Cleveland advantage for when the fan is mounted on the *opposite* side, a second oil seal is needed. This results in additional friction loss due to seal drag—and is another point where oil leakage could occur.

Remember, it was Cleveland design engineers who pioneered both fan cooling and centrifugal casting of bronze gears—and after sixteen years of rugged field usage in all types of industrial plants, have now incorporated these features in all units (from 3 to 12-inch centers) of the new standard Cleveland Speed Reducer line.

Get the story of these new speed reducers from your Cleveland representative, or write today for free 36-page illustrated Bulletin No. 410 that contains complete engineering information. Either way, you will get the answer to improved speed transmission—at savings of 50% or more on per horsepower cost!





Announcing
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OUR JOBS
DEPEND UPON THE QUALITY WE
BUILD INTO OUR PRODUCTS

THE BIG MESSAGE: Workers at GM's Frigidaire Div. plant at Dayton, O., pass under sign stressing quality.

Quality and Service Demands Challenge Autos, Appliances

Customers get tougher, products more complex in consumer durable goods. Companies step up quality control and reliability efforts to meet demands.

But field service lag hurts. Appliances are chief target of service complaints.

▪ There were a number of surprised used car dealers around earlier this year. That is when 120 used Fords from one to five years were snapped up in quick fashion with little or no dickering.

The buyers? Ford Motor Company.

These cars were for checking by Ford product engineers. This was reliability in action.

Eventually, these cars would be road-tested, checked item by item, torn apart, analyzed, and from the parts heap could come better cars in the future.

This is but one of the ways one big consumer product maker goes after weak parts, faulty components, hidden squeaks, and the like. It shows the extent it feels it is necessary to go to assure quality and durability in the products.

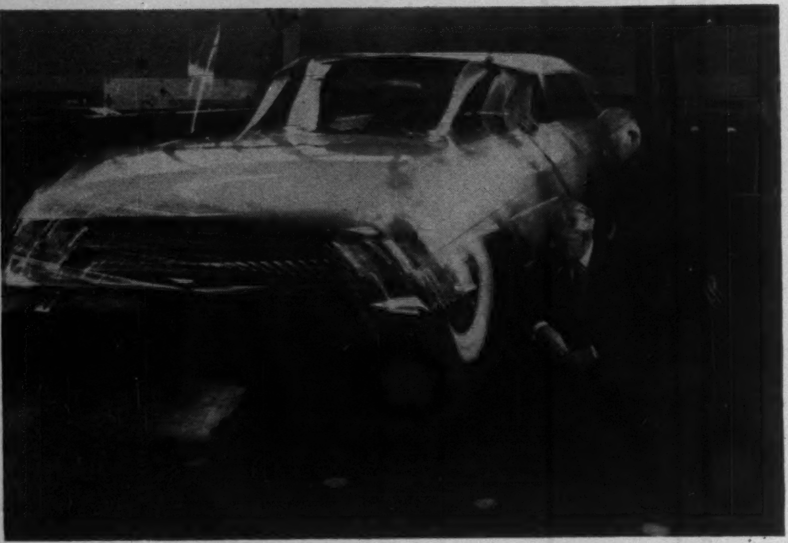
The Problem—Automakers and appliance makers are deeply enmeshed in the consumer demand web of more complex products simply operated, performing more functions more efficiently at a lower price, and requiring little or no service.

As shown in the case of the used Fords, these manufacturers realize their dilemma. And they are doing something about it. But there are problems.

Increasing product variety and complexity presents one big problem. This is shown for the auto industry when C. G. Bauer, director of quality control for Chrysler Corp. says:

"Today's customized production means the average U. S. assembly plant that builds only one line of cars must handle 8,000 different parts and assemblies. A two-shift production day, at the rate of sixty cars per hour, uses 7,700,000 separate pieces ranging from a bolt to an engine. The Plymouth assembly plant in Detroit could make one million units without building two identical cars."

Appliances — The story is the same in appliances. In 1949, Frigi-



QUALITY CHECK: Test of 1961 Ford Galaxie on vibration test is watched by John Dykstra, Ford vice president, Manufacturing, kneeling, and Dr. Andrew A. Kucher, vice president, Engineering and Research.

daire made two washers and one dryer. Now, it makes 50 washers and 28 dryers.

And today's appliances are parts-loaded. A typical dryer today has 330 parts, a washer 500 parts, a combination washer - dryer 750 parts.

The parts now are more complicated. A top-model washer of 10 years ago required 15 separate wires or conductors with 20 lead connections. The latest model of the same make has 53 separate conductors and 71 electrical connections.

Says the assistant chief engineer of one of the large appliance makers: "We have by no means reached the end with respect to development of new use features in these products."

Tighter Controls—One way that auto and appliance makers are meeting the product complexity problem is through better inspection, quality control and reliability programs.

Quality control is generally regarded as dealing with actual manufacturing reliability. Reliability, as such, goes a step beyond, says J. A. Anderson, AC Spark Plug general manager:

"It is the means to discover how well a product made to specifications and standards will perform in the hands of the consumer."

Mr. Anderson illustrates the "reliability concept" by the fact that engineers last year had reports of speedometer cable failures because road salts were getting inside the casing and damaging the cable. He says, "The product was made exactly to the engineer's specifications. It passed every inspection. But it failed in the hands of the customer. That's why we need to go further than just quality control."

Customer First — Here is how Ford vice president, manufacturing, John Dykstra, explains the philosophy of reliability:

"The philosophy behind our reliability program is to assure our customers a trouble-free automobile. To do this we must adhere to strict interpretation of specifications inside and outside of the car. The heart of the company's new quality program lies in a rigid requirement that parts shipped from supplier plants must fully meet all specifications."

Frigidaire has shown what an intensive and management-backed reliability program can do. According to vice president H. F. Lehman, the company's 1960 refrigerator line required 61 pct fewer service calls than comparable models in 1948; ranges 28 pct fewer calls, and washers 67 pct fewer calls.

Carrier Corp. trains it's service dealers with their own service specialists. Also, the cost of Carrier's quality control program runs about 10 pct of total manufacturing expenses, according to Carrier president, Russell H. Gray. The York Div. of Borg-Warner Corp., makers of air-conditioners, reports "drastically reduced field service costs" on their 1960 product line as a result of their stepped-up quality control efforts.

New Techniques — Consumer product makers are quick to adapt and refine their reliability techniques. Says J. F. Wolfram, general manager of Oldsmobile Div. of GM.

"With the scientific and electronic advancements brought about by missile and space research, newer and more modern techniques of establishing a higher degree of reliability have been discovered. Adapting this all-inclusive approach to our program was a logical step."

But there are practical limitations to reliability programs in assuring customer satisfaction. The cost of the finished product is one limitation. And the sheer mathematics of reliability itself is another. Here is how D. W. Lynch, GE's manager of engineering, Home Laundry Department puts it:

"If improved market appeal requires the addition of certain automatic features, these additions must subtract from reliability. You cannot add parts and increase reliability unless either 1) the added parts are for the purpose of eliminating a problem whose failure rate exceeds that of the added parts, or 2) the quality level of the entire product is improved to offset the failure rate of the added parts."

Troubles Mount — The relative trickle of flaws, faults and errors that sift through the best of reliability programs builds up geometrically in trouble and cost. Mr. Bauer of Chrysler Corp. illustrates this with figures:

"The direct labor cost of installation of a certain small interior accessory in an automobile is 10 cents. If this accessory is discovered to be defective at a later inspection point in the plant, the direct labor cost of replacing it rises to $1.50. But if the defective item gets out of the plant and we have to replace it through dealer warranty, the cost rises to $7.50."

One service industry executive has estimated that the average U. S. auto and appliance owner spends $300 to $500 a year to keep this equipment running properly. This is an estimate. But a certainty is that expenditures by U. S. consumers for services have risen by 103 pct since 1950. Consumer spending for durable goods for the same period rose by only 40 pct. Consumers are increasingly conscious of the big budget gouge caused by service costs.

Manufacturers' Role—Manufacturers of consumer durables—even those with top reliability programs—are finding it necessary to come closer to field service problems.

One appliance maker has his new designs reviewed by service, sales and production heads. The complete design is coordinated so that the entire unit is serviceable as well as functional.

Another appliance manufacturer is "designing service out." In this case he designs every major component for the life of the appliance, and makes the small inexpensive parts easily replaceable.

Another company in the field has given division status to the service group. And Norge is typical of the several manufacturers where the service head reports directly to the company president. Still another manufacturer has developed an annual service contract plan.

Dealers' Cost Squeeze — Auto companies, generally, do not face as critical service problems as do appliance makers. The latter may have to play a bigger, more direct role in customer service if only because of the cost squeeze hitting retail service dealers.

According to figures of the National Appliance and Radio-TV Dealers Assn., servicemen's wages and expenses in 1955 averaged 5.2 pct of sales. At that time, salesmen's pay was 7.2 pct. Today, 7.4 pct of sales goes to servicemen, 6.6 pct to salesmen.

Net operating profit of these dealers came to a slim 0.98 pct on net sales in 1959. The trend is down. In 1958 profit was 1.12 on net sales. Dealers with service facilities showed lowest gross margins.

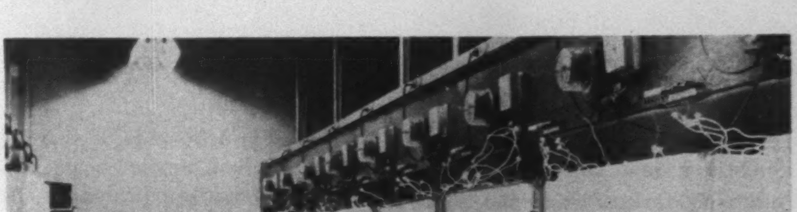
Recruitment of servicemen is difficult, and technical know-how so high, that one service dealer has forecast that he will have to pay a serviceman $10,000 in wages within 3 years.

Service Complaints—And still, a recent survey of their customers by one utility indicated that one-third of those who had repairs made were dissatisfied. Two-thirds complained of delays and poor workmanship. And another survey of 35 service dealers showed, by their own admissions, that 46 pct of their customers complained that repair costs were too high. Also, 46 pct thought the quality of the service poor.

Within the last few years the Association of Edison Illuminating Companies has set up a Committee on Appliances and Services. This committee is working closely with manufacturers and dealer organizations in setting up servicemens' schools, consumer relations, product simplicity, standardization, and other aids.

The big question in the appliance industry is whether the reliability system will be extended by manufacturers into service as well as production.

The auto industry's recent extension of warranties from 90 days to one year is evidence of manufacturers' increased interests and responsibilities in maintenance and service on the products they make and sell.



THE HARD LOOK: All kinds of climatic conditions existing in U. S. are simulated in Frigidaire's Proving Test Laboratories in Dayton, Ohio.

BUILDING BLOCKS: These engine blocks were diecast for American Motors Corp. by Doehler-Jarvis.

All Eyes on Aluminum Engine

Aluminum is gaining acceptance by the major engine builders.

Only a few builders are not planning designs using the lightweight metal engine construction. By T. M. Rohan.

▪ "It's safe to assume that every major engine builder in the U. S. is looking into aluminum engines now that a big breakthrough has been made," the head of the Society of Automotive Engineers Powerplant division said last week.

"The only exceptions I can think of offhand are where the builders can use engine weight, such as in railroad locomotives, ships and earthmovers," said Gregory Flynn, Jr., chairman of the division and head of the Mechanical Development Div. of General Motors Research laboratories at Warren, Mich.

About 500 SAE engineers attended the National Powerplant meeting in Cleveland last week. The group is a new expansion of the SAE's former Diesel Engine activity.

Want Elasticity—Major limiting factor on aluminum for engines in most discussions appeared to be limits of elasticity. Engineers want a more elastic material despite other advantages of light weight, faster and cheaper machining, and ease of using thin-walled design, especially for cooling fins. In the materials field, it has fast become the hottest subject around.

Hot and Fast — Temperature limitations of super-alloys being used are causing supercharger designers to burn the midnight oil in many a drafting room. Operating temperatures are about 1500°F on the hot side for both diesels and aircraft so that inter-coolers are necessary to hold things together. Rotation speeds are from 20,000 rpm to 30,000 rpm.

Under centrifugal force at this temperature and speed the impellers elongate. To allow clearance for this means a sacrifice in efficiency.

Other popular subjects were a pump engine in a racing car, and compact Caterpillar tractor engines, lighter but more powerful than predecessors.

Where's the Fire?—The pump engine was developed by Coventry Climax Engines Ltd. of Coventry, England, to power a light-weight fire pump for civil defense use. Aluminum castings were used for cylinder block, crankcase and head. The whole 4-cylinder unit with pump weighs under 400 lbs. and does the work of a 1700 lb. World War II unit.

W. T. F. Hassan, chief engineer said that in 1954 racing enthusiasts inquired about using it in sports car races and had immediate success at Le Mans and other races.

Caterpillar Power—A new generation of compact engines at Caterpillar Tractor Co. is higher powered than predecessors, yet lighter weight and more economical to build. A 4-cylinder engine which used to weigh 1985 lb and deliver 115 brake horsepower now weighs 1600 lb and develops 135 bhp.

Diecasters Plan 1961 Spending

Outlays Will Be on Par With 1960 Figures

Diecasters are looking forward to spending about the same on capital goods as they did in 1960.

However, some say capital spending will depend on the amount of business being done early in the year.

—By F. J. Starin.

▪ Executives of job diecasting companies are now sitting down to ponder their capital spending in 1961.

Indications now are that a great many of them will go into 1961 with a big question mark on this column in their ledgers.

Some companies have already made up their minds. But there seems to be no real pattern.

One New England diecaster intends to spend the same or less for capital equipment in 1961 as he did in 1960. The reason: "We have plenty of capacity. What we need is greater plant utilization."

Great Expectations — Another Eastern diecaster figures on spending more next year, mostly for larger equipment. This company is very optimistic. It did 10 pct better business this year than last year, and expects another 10 pct increase in 1961.

A Midwestern company figures it will likely spend the same or a little more next year—mostly for new, automated equipment to replace slower and obsolete machines.

Similar Planning—Significant is the fact that the overwhelming majority of companies polled answered that they will probably play much of their capital spending by ear next year.

"We never really outline spending at the beginning of a year." says an executive of a diecasting company. "We buy the equipment we need for specific projects during the year. And unless business gets better our capital spending may drop to almost nothing."

Another company says almost the same thing exactly. "We tie our spending to specific programs," reports a spokesman. "And right now it doesn't look like we will spend as much."

This spokesman also notes what is perhaps the most serious problem facing job diecasters currently—the thing that will be the biggest influence on capital spending next year:

Tight Squeeze — "Our sales in 1960 were definitely up over 1959," he reports. "But our profits couldn't come close to keeping pace. We, and the rest of the industry, are caught in a profit squeeze."

The consensus is that unless the profit squeeze eases, most companies will be forced to keep capital spending down. A sharp drop from 1960 is likely, although this may not be too serious since many companies admit they spent more this year than usual.

On a tonnage basis, there is almost universal optimism for 1961. Some diecasters qualify this to "the last three quarters of the year," or "after we get the first quarter out of the way." And almost all say business is likely to be only slightly better. The most liberal estimate is 10 pct.

Bullish Outlook—A recent meeting of diecasting equipment makers and suppliers in Detroit was somewhat more bullish than the casters themselves.

A spokesman for one company notes that from 1952 to 1959 the diecasting industry grew over 74 pct in tonnage business, while the gross national product rose 38 pct in the same period. This company expects the trend to continue.

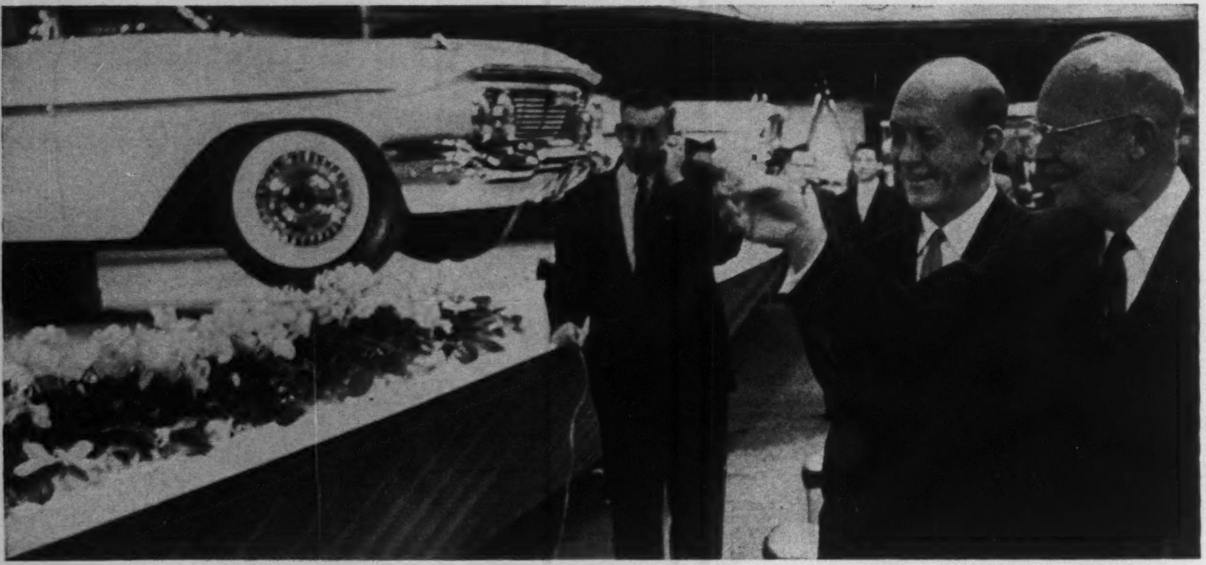
Diecasting Outlook for Metals

Aluminum—Automotive is, and will cotninue to be the fastest growing market. But within a few years anodizable alloys will be easily diecast, opening the door to many other markets—appliances, toys, business machines. Fastest growing metal for diecasting.

Brass—The major retardant is that die life is very short when diecasting this metal. New developments in tool steels may improve the picture, but most brass castings will continue to be sand cast.

Magnesium—There has been a steady decline of magnesium diecast. This is likely to continue. Some casters say it is because many fear handling it. But more likely it is the higher price that has hurt worst.

Zinc—Diecasters agree that zinc, particularly in auto uses is going to make a comeback. The reason: Improved finishes in the last few years. Zinc diecast in 1960 is likely to top 1959. And many diecasters say 1961 is almost sure to top 1960.



PRESIDENTIAL TOUR: General Motors Corp. president John F. Gordon (left) guides President Eisenhower around the exhibits at Motorama, the automotive spectacular which opened at the Waldorf-Astoria last week.

GM Plans Record Spending in '61

General Motors again used the opening of a Motorama to announce a major spending program.

It plans to invest $1.25 billion in 1961 for plant, machinery, equipment, and tooling of U. S. and foreign plants.

▪ History has a way of repeating itself. In the case of General Motors Corp., it has done so again.

In 1954, GM used the occasion of one of its periodic Motorama automotive spectaculars to announce a $1.5 billion expansion and modernization program to extend over three years. At the time, the country was going through a recession.

Last week, another Motorama opened. And with it came an announcement by GM board chairman F. G. Donner that the giant automaker will spend $1.25 billion next year for plant, machinery, equipment and tooling. This will be $50 million more than the company is spending in 1960 and will set a new record for one-year spending.

Period of Growth—Mr. Donner expressed a guarded optimism toward prospects for auto sales. "If consumer incomes continue to rise and consumer confidence is sustained, sales of domestic and foreign-built passenger cars should reach a level of 7 million units in 1961," he said.

Overseas Markets — Even more spectacular growth is expected in foreign markets. He pointed out that there were about 2 million cars on the road in the six European Common Market countries in 1950. Today there are about 11.5 million.

How It's Divided—How will GM spend its money?

"We figure that about 75 or 80 pct of this expenditure is going for domestic purposes," GM's chief executive explained. The $1 billion domestic share of the total expenditures would be within 10 pct of GM's record for a single year.

The remaining 20 to 25 pct will be spent in 19 other countries as the first part of a two-year $500 million overseas spending program.

The combined spending programs should provide a healthy boost for machinery makers and tool and die shops.

Buy American—"We figure that something like 60 pct of the total will be for facilities such as machinery and equipment. The balance will be for tooling our new models," the GM executive says.

All of the money for domestic facilities, he said, will be spent in the U. S. (In recent years, automakers have experimented with some foreign tooling.) In addition, a sizable part of the funds for foreign projects will be spent in the U. S.

Nor does GM intend to purchase overseas parts or components which will be used in U. S. cars. "As a matter of fact," Mr. Donner pointed out, "it's the other way around. The automatic transmissions in our foreign cars will be American-assembled, American-built."

Do You Make These Mistakes in Europe?

Report on Europe

Fourth of a series of on-the-spot reports by The IRON AGE editor, G. F. Sullivan. It is written especially to bring European developments into closer focus for the metalworking executive.

▪ When a U. S. manufacturer makes an error in his European operations it is usually because he's unfamiliar with the people or the forces at work there. The "Ugly American" was not written about U. S. businessmen in Europe.

Those unpleasant stories you hear usually concern the occasional tourist—and in this there's little difference among nationalities.

U. S. management and manufacturing methods rate high among Europeans. To find a pattern of errors or problem areas, you have to talk to U. S. businessmen on the scene. In doing so, these were the ten most often mentioned:

(1) A tendency to overlook some facts of European history: There are six nations in the Common Market, seven in the Free Trade Assn. They speak 11 different languages and vary considerably in their political philosophies. Off and on for 2000 years they've been fighting each other; some now own land that once belonged to others.

One well-known U. S. company hired a titled German to head up European sales. On the face of it, this was not good for business in at least five countries.

(2) Moving in without enough advance study: Like many elopements, such arrangements are likely to blow up. Even on a license basis, much study is needed. For a joint venture, some U. S. firms have spent over a year looking over possibilities on the scene before taking any decisive steps.

(3) The urge to immediately convert a European acquisition to U. S. management methods: Whether in the shop or the office, this usually spells trouble; in one case it cut sales in half.

(4) Too much reliance upon delivery promises: Builders of other than standard machinery are way behind on delivery dates—a new German plant and its staff stood idle for six months due to late delivery of tools.

(5) Assuming success can be transplanted: Marketing information is not as complete in Europe as it is in the United States. The Common Market is still not one big market. Sales targets are tough to set; knowledge of competitive factors is hard to come by. Advertising which would move goods in America won't work in Italy, for instance.

(6) Failure to consider all cost factors: Inventory cost is one item. In Germany you order mill steel 9 months ahead, subject to cancellation 90 days prior to promised delivery. Result: Raw material, components and even finished goods inventories are often enormous.

(7) Personnel training and piracy: Many German engineers feel they should change jobs frequently to "develop broad experience." Result: Training costs are high, particularly if you use inches instead of metric units.

In Italy, executives have a sort of union which cuts down on mobility—but works the other way too. If you want to hire an Italian executive, he must give anywhere from 1 to 4 months notice depending on his position. (For a plant superintendent it is usually 2 months). Or, you have to pay his employer that sum if you want him sooner.

(8) Absenteeism: This is a problem in Germany where there's a lot of overtime. If a man doesn't feel like working on a Monday, he goes to a physician whose pay from the state depends upon the number of patients he sees. He hands the worker a slip which recommends a walk in the park for that tired feeling—or two days of walking in the country.

(10) Design Problems: Steel quality is often not up to U. S. standards. High-strength, low-alloy steel is not generally available. This may force some redesign of U. S. equipment for overseas manufacture. Further, with business booming, rejections are up: One farm equipment maker recently rejected 22 pct of incoming steel shipments during one month.

(10) License troubles: Many sources underline the legal factors that should be covered in working out and signing licenses. They also advise retaining a lawyer in the country of the licensee. But this is not enough. To be really successful, such arrangements require: (1) Close personal contact, often on a family-to-family basis; (2) the firm granting the license must be ready and willing to supply new engineering, manufacturing and sales ideas—and help put these across to the licensee.

It may take one or more men a year or more to do this indoctrination. Management must be willing to put in time working out the starting details—and working on the day to day problems.

Industry Studies Job Stresses

Tests Underway to Find How Workers React

Both science and industry try to discover how the human body acts as a work machine.

Some progress has been made, but more detailed data is still needed.—By G. J. McManus.

▪ Science—and industry—want to know more about how the human body acts as a work machine.

Some of the answers came to light during a recent meeting of the Industrial Hygiene Foundation of America. Held at Mellon Institute in Pittsburgh, the session produced a call for greater knowledge about the human being as a work machine.

Three Study Areas — What's needed, say the doctors, are three things:

Data on the physical, mental, and emotional capabilities of people.

Information on the physical and psychological stresses applied by jobs.

Means of integrating information in a way that gives total job stress and ties this to individual capacity.

"We've found an aluminum worker can sweat at the rate of a quart an hour," says Dr. J. P. Hughes, medical director, Kaiser Aluminum and Chemical Corp.

"An engineer would not use a machine without knowing its capacity to produce," says Dr. H. S. Belding of the University of Pittsburgh.

Stress and Capacity—To select and preserve human resources, says Dr. Belding, industry must develop objective means of measuring the gap between stress and capacity. This reserve cushion determines how well a man will perform in a job over a sustained period, he feels.

There have also been studies of the energy requirements of jobs. Tables have been compiled to give the calories expended in different types of movement. Standards have been devised for the maximum energy flow over different periods of time. These are fairly general and, in some cases, have not jibed with recent observations.

More Checking Needed — The trouble with much of this kind of information is that it is too remote from particular situations and particular individuals. Medical men are now getting more into specific checks on actual jobs. Dr. Morris tells of measuring reactions of farmers to things like power steering and air conditioning for tractors.

Dr. Hughes of Kaiser Aluminum describes new techniques used to check worker reactions in hot, humid conditions. FM radio transmitters, worn by workers, send out a running record of heart behavior. Men are weighed before and after work to measure sweat rates. Body temperatures and other indicators are checked while jobs are being done.

Heat Shields — One aim of the Kaiser study has been to determine the value of shields in protecting men from heat sources. The tests have shown that shields can reduce sweating by 50 pct in some situations. Dr. Hughes points out the study has given management objective, specific numbers to consider in making a decision on expensive shielding devices.

While doctors feel they are making progress in the physical field, they admit this is only part of the story. A full measurement of work stress must take into account the boredom of the secretary, the pressure for decisions on the executive, and the fears of the farmer.

"How do you measure the anxiety caused by a rain cloud in the middle of harvesting?" asks Dr. Morris.

What's needed, says L. W. Gregg, Carnegie Institute of Technology, is computer simulation of the human system.

Worker Health: What Record Shows

Interest in industrial hygiene and health programs is a big—and growing—part of U. S. manufacturing. Medical care costs have gone up 45 pct in the last 10 years.

Here's industry's record in the field of occupational health during the year 1958:

Health Services Provided

8000 plants

Plant Accidents

Deaths—13,000
Disabilities—1.8 million

Injury Losses

Time—38 million man days
Wages—$4 billion

Illness Losses

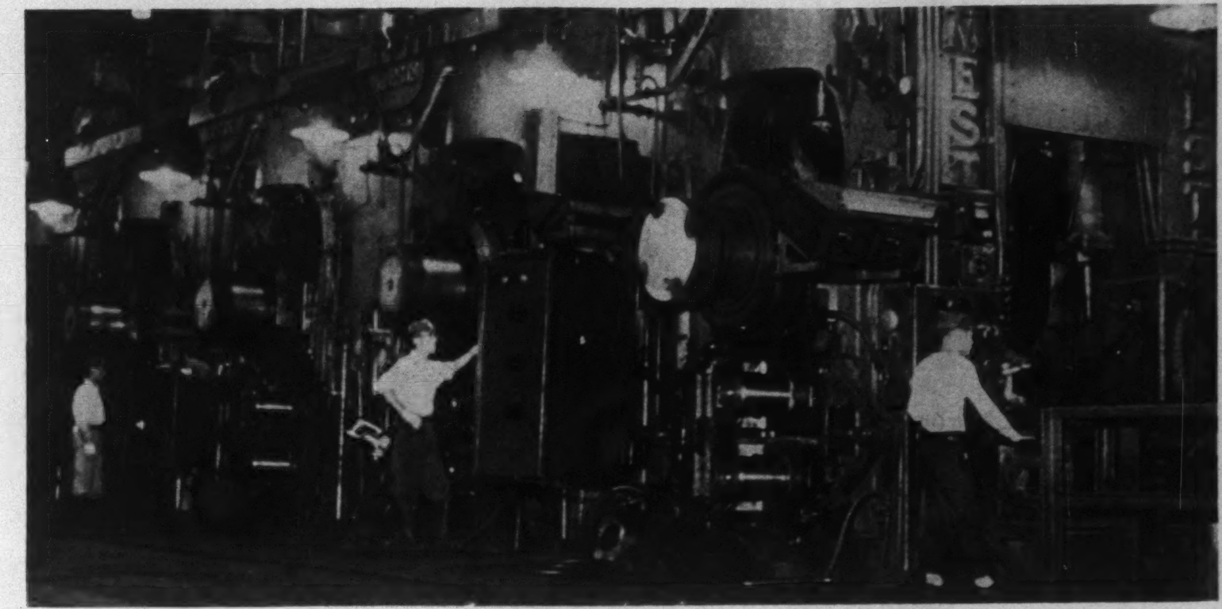
Time—500 million days
Wages—$6 billion

Group Insurance Pool

$4.1 billion

Group Benefits Paid

$1.3 billion



UNITY, STRENGTH: Japanese labor leaders are starting a push to get higher wages, shorter hours for workers.

Japan's Steel Unions Strengthen

Japanese steel union men toured Chicago to learn how U. S. unions operate.

Although their unions are relatively weak, they are striving for more power. If they get it, it could mean an increase in Japan's steel costs.

—By K. W. Bennett.

▪ Japanese steel, which has undersold U. S. material by as much as 40 pct, delivered here in recent years, is developing problems of its own. A Japanese steelworker still gets only $150 a month, but here's what could happen:

Japanese labor leaders touring the Chicago area under the auspices of the United Steel Workers report wage gains in Japanese steel mills are running 10 pct per year. The industry has tripled output in the last decade, but wages have increased 400 pct. On the say-so of top Japanese labor men, unions there will seek to double present wage levels within five years.

The Opposition — Japanese steel management will fight back from a position that might seem weak. Operations there are at 100 pct of capacity. Steel companies are adding manpower at the rate of 1000 men per year, or more. The Japanese say their mills are the newest in the world and have top output per manhour worked. Japanese steel industry is expected to turn out about 20 million tons this year, and is shooting for 45 million tons annually by 1965.

Labor problems are building up. Japanese wage bargaining has been on a single company basis, but unions will push for industry-wide bargaining power.

Long Hours—A three point program is being launched with stronger industrial union ties as the prime objective.

Second, unions will strive for a cutback in working hours. The usual work week is 48 hours, but high steel demand makes the 55-hour week more common.

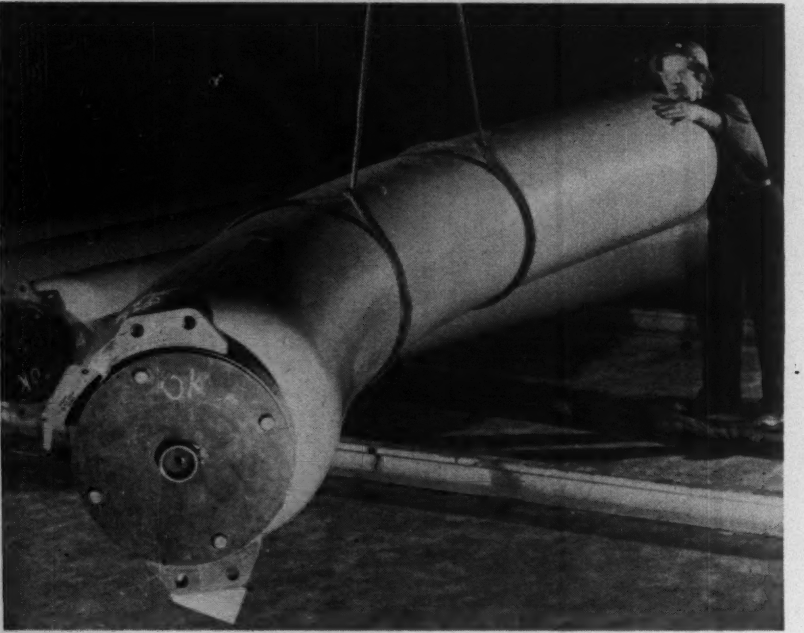
Third Japanese objective: To study U. S. union techniques for import to the home islands. One of the first payoffs could be a troublemaker for Japanese steel management. Japanese union men learned for the first time that it is possible to bank a blast furnace and shut it down. They had believed, and say the idea came from Japanese steel management, that it is impossible to close down a blast furnace.

After two weeks in Chicago, looking over some furnaces banked for lack of business, they are going back to explain to the Japanese steelworker that there is something basically wrong in Japanese steel technology—or industry honesty.

But the Japanese union men admit they have troubles. Industry-wide unions are weak. Most union officials are company employees, holding only temporary union office.

They must also buck frequent government intervention in steel mill operations. There is no minimum wage law.

It Just Looks Like a Hot Dog



"POP-GUN"—U. S. Steel Corp.'s National Tube Div. has developed 15-ft tanks which will contain compressed air and be used in the ejection of Polaris missiles from under water. The tanks are pierced from solid steel billets and will serve as "pop-guns" during missile launchings."

Small Business Contracts Gain

Prime government contracts awarded to small companies under the Small Business Administration's joint set-aside program increased 13.6 pct in number and 37.7 pct in value during the first quarter of this fiscal year as compared to the same period the last fiscal year.

During July, August, and September, small companies received 6456 government contracts valued at $286,277,477. During the comparable three months of last fiscal year, small businesses were awarded 5682 contracts valued at $207,882,722.

On a cumulative basis, since the start of the SBA's procurement program in 1953, more than 100,000 prime government contracts have been awarded with a value of $3.9 billion.

In September, 1789 prime contracts were awarded with a value of $64.7 million. Of these, 1303 contracts for $56.2 million were awarded from military agencies of the government. Another 486 contracts totaling $8.5 million were issued by civilian agencies.

New Attacks On Defense Procurement

Congressional investigators' latest charge against the Defense Dept. is that its method of buying supplies is wasting billions of dollars. The congressmen say this money could be saved.

They call defense procurement methods "a perennial multibillion dollar burden of unnecessary costs and wasted resources resulting from poor organization and mismanagement." The Senate-House Procurement Subcommittee reports billions could be saved if:

Supplies and common activities of the Army, Navy and Air Force were consolidated.

The law requiring competitive bidding were observed.

A "genuine standardization program" were launched to reduce the more than $44 billion worth of supplies now held by the military.

Scrap Exports At New High

Commerce Dept. sources say foreign buyers are coming to the rescue of the U. S. iron and steel scrap industry. Without export increases, they say, scrap dealers in areas remote from mills would have gone out of business.

The volume of export license approvals for iron and steel scrap hit over a million tons last month. The figure appears to be an all time high in licensing.

The Bureau of Foreign Commerce says license approvals for October were for 1,099,352 net tons of scrap. This was about 700,000 tons over the previous month and some 300,000 tons over the Spring months.

Titanium Shipments Up

Titanium shipments are running more than a million lb over last year, according to the most recent figures. Over the first seven months, 5.7 million lb of mill products were shipped. August was up more than 50 pct from July and about 200 pct from August of 1959.

If the August pace continues, shipments will top the record set in 1957. However, producers indicate there has been a tapering off since early summer.

Borg-Warner Plans $40 Million Expansion

Borg-Warner Corp. plans to spend $40 million on new plants and equipment next year.

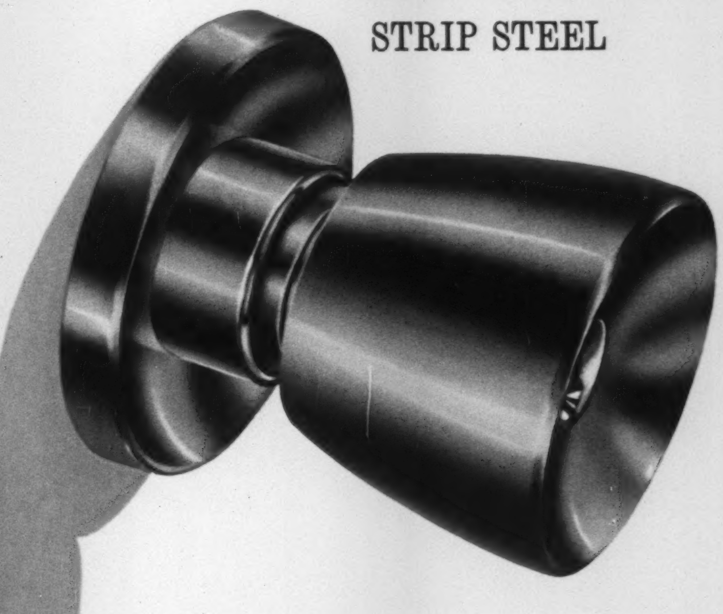
Robert S. Ingersoll, Borg-Warner president, says, "I believe this record investment, in the face of lower sales and earnings for the first nine months of 1960, demonstrates our confidence in Borg-Warner's future."

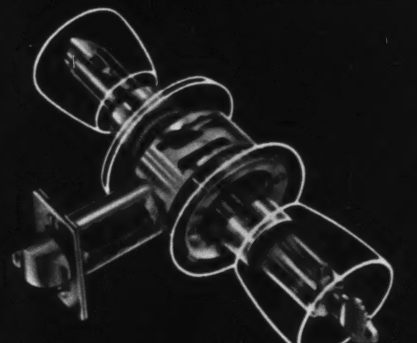
He notes that nearly $30 million will go into domestic expansion and modernization with the balance going into overseas operations.

Extra years of fine lock service

-thanks to Superior Stainless

STRIP STEEL





Inside Schlage's all stainless lock; easy-working for a lifetime with Superior Stainless noncorrodible knobs, rose and internal mechanism.

The finest lock of its kind in the world, this pride of the Schlage Lock Company is built entirely of stainless steel—outside and in. Designed for institutional, commercial and marine use, it will deliver many years of faithful service undimmed by corrosion, tarnish, chipping or peeling because it's *solid* Superior Stainless . . . the stay-bright, easy-to-fabricate metal for your toughest applications. • Find out how Superior Stainless Strip Steel can better your present products and the ones to come. Consult a Superior sales engineer for facts you can use right now!

SUPERIOR STEEL DIVISION

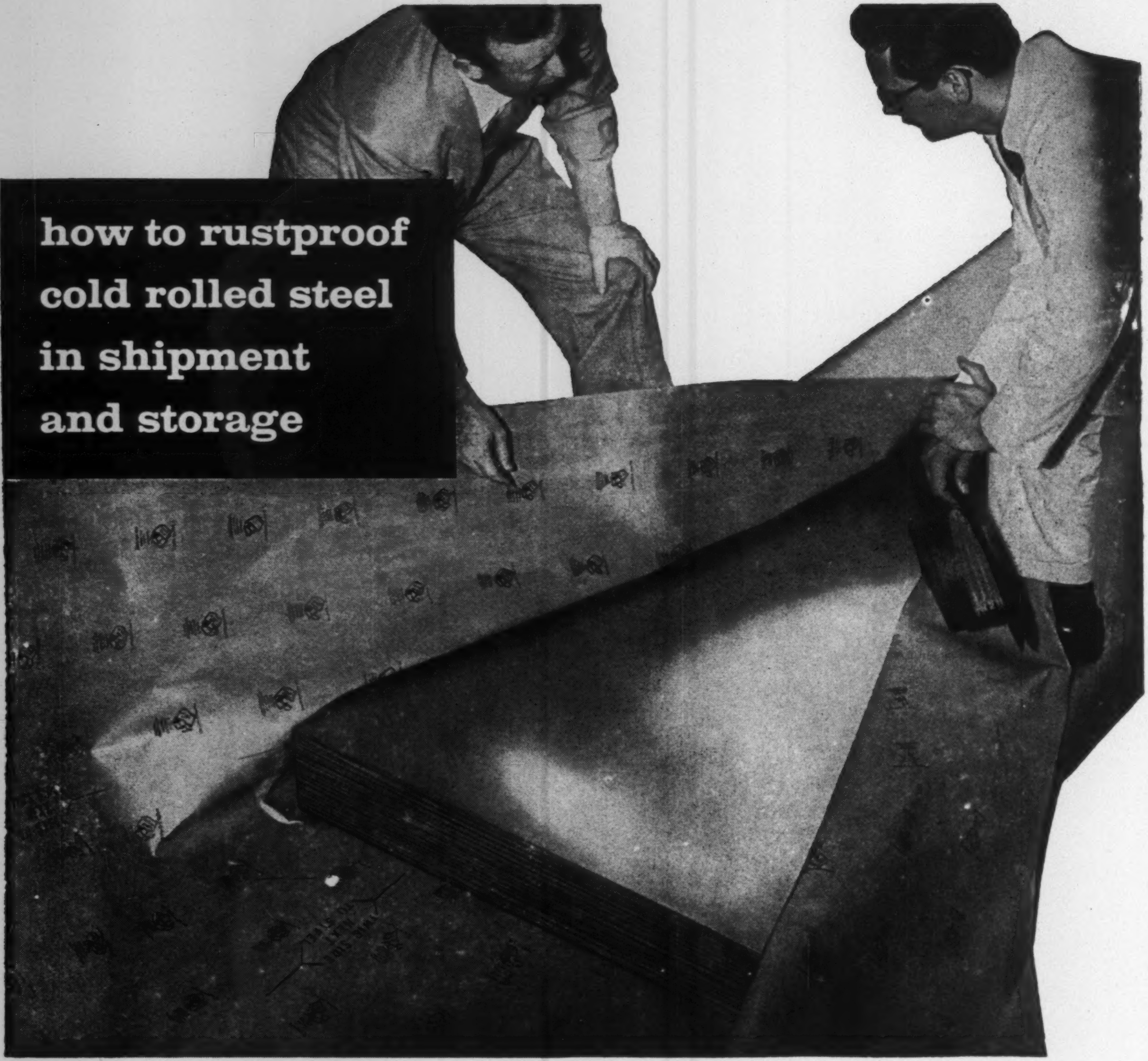
OF

COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York

Stainless Steel

how to rustproof cold rolled steel in shipment and storage

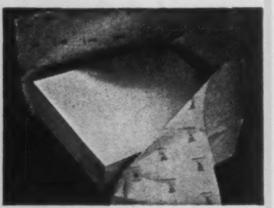


Proved by actual test! Unwrapped steel rusted within a few hours. Identical steel wrapped in Ferro-Pak showed no signs of rust . . . even after several months. Non-toxic chemical vapors from Ferro-Pak coat the steel with an invisible film that makes it impossible for rust to get the slightest foothold.

Even under adverse conditions, such as outside storing or shipping, Ferro-Pak provides complete protection. It is waterproof, strong, yet highly flexible and easy to handle. The chemical rust inhibitor is compatible with oil and stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write Cromwell Paper Company, 180 N. Wabash Ave., Chicago 1, Ill. Dept. A10.

How to rustproof a freight car—Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.



How to rustproof black plate—On this light gauge, dry, uncoated steel, rust can start from a fingerprint. Ferro-Pak keeps black plate rust-free even when the humidity soars!

FERRO-PAK®

by Cromwell

For over 38 years—
"Paper Engineers" for Steel

Has Easier Credit Helped?

As the economy sagged, several moves were made to make credit easier.

The big question: How much have these measures improved business?

■ As 1960 started, there was concern tight money might slow down the boom. With demand for credit high, the argument went, there might not be enough to go around.

But as the year advanced, tight money became a problem for other reasons. In many parts of the economy, including metalworking, the boom ran out of steam. With this, came a decrease in demand for credit.

FRB Actions—Action to stimulate borrowing was needed. And, in a series of moves, the Federal Reserve Board acted. The discount rate (the rate the FRB charges member banks on borrowing) was dropped in two cuts from 4 pct to 3 pct. The prime rate charged on commercial bank loans fell from 5 pct to 4½ pct.

Other changes by the FRB were made to free member bank reserves to meet cash and credit needs. With less demand for borrowing, other loan rates also fell.

All these moves helped make credit easier. How successful were they? On the evidence so far, this is the conclusion: Easier money has encouraged borrowing, but it's too early to tell how much.

Bank Loans Up—So far, these are the results: Commercial bank credit increased around $4 billion from the end of May to the end of September, according to preliminary estimates. Usually, say bank economists, this credit does not expand so rapidly at this time of the year.

About half the expansion this year was in loans—many reflecting seasonal needs for cash. Demand was off during the warm weather months of July and August. But it picked up in September.

However, some further declines came during October.

In the consumer sector, the results of the money easing were less noticeable. Real estate loans went up a little less than seasonally.

Retail Sales Down—Retail sales this July through September were off almost 3 pct from the second quarter. In fact, sales just barely topped year-ago levels, despite a gain of about 6 pct in disposable personal income.

Among the goods which suffered most in lower sales: Durables, especially autos. But sales of nondurables were also down. Thus far in the third quarter, auto sales have picked up strongly.

Housing Outlook—The effect of easier money on the housing market may take a little while to show up. But one expert on housing finance is encouraged. Says C. Armel Nutter, president of the National Assn. of Real Estate Boards: "There's an increased reservoir of funds at interest rates below those of six months ago for prospective buyers of homes with conventional financing."

Is Management Understood?

■ When management talks, how well is it understood? Not very well, according to a study of 100 companies made by the Savage-Lewis Corp., Minneapolis.

Here's what the survey showed: Vice-presidents only understand 67 pct of the message from the board of directors or top management. At the level of the general manager, the amount of the same information surviving was down to 56 pct.

Further Drops—As it reaches the plant manager, the level drops to 40 pct. Among foremen, it dips to 30 pct, and finally, among workers, the rate of understanding is only 20 pct.

This means, in other words, that one out of five messages from the top gets to the man at the bottom.

How Not to Listen—Commenting on this, Dr. Ralph G. Nichols, Univ. of Minnesota, says, "Downward communication is only going to be more effective when top managers understand the attitudes, opinions, ideas, and suggestions of the people at the bottom."

Among bad listening habits he includes these: Calling the subject uninteresting; criticizing the delivery; listening only for facts; outlining everything; faking attention; evading difficult subjects; responding to emotional words; wasting thought power.

Dr. Nichols points out learning from listening operates at an efficiency of only 25 pct.

M&T produces a vinyl plastisol so tough it's used as a dishwasher lining

AMONG the tough jobs for which M&T vinyl plastisols are suited, one of the toughest is that of a dishwasher lining.

Consider the service conditions: scalding hot water, mixed with highly alkaline cleaners which are death on ordinary coatings, is hurled with high velocity against the tub. As if this weren't enough, the lining has to be resistant to food stains, avoid cutting and impact damage from accidentally dropped or broken objects. Equally important, it should be non-aging, last the life of the machine.

A Unichrome* Plastisol Compound satisfies all these rigorous conditions . . . and more. Sprayed in substantial film thickness, it helps muffle the drumming of water on tub. It comes in colors that attract the buyer. It sticks tight to the tub. Torture-tested for periods equivalent to many years' service, it showed no loss of bond, no blistering or breakdown.

Unichrome Plastisols apply by usual production methods. They're also being used to multiply the wear-resistance of agitators and impellers . . . to corrosion-proof a chemical carrying tank car . . . and on a host of other industrial and consumer products. Learn what Unichrome Plastisols have to offer *you*. Send for bulletin VP-4 or for an M&T Man.

*M&T's registered trademark

M&T **coatings** · chemicals · metals
plating products · welding products
METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey

AMC Paces Supplier Expansion

Rambler's Popularity Has Erased Consolidations

Once American Motors Corp. was consolidating. Now it is rapidly expanding.

And, because production capacity has increased, many suppliers such as Budd Co. must expand too.—By A. E. Fleming

▪ There was a time, back in 1954, when American Motors Corp. was consolidating. In fact, some skeptics believed it was only a question of time until it folded. Today, it—and its suppliers—are rapidly expanding.

An example of this expansion is the recently completed facilities of the Budd Co.'s Gary, Ind., plant. This plant is devoted exclusively to turning out underbodies, uniside assemblies, door assemblies, fenders, roofs, tailgates, and miscellaneous small parts for Rambler's three series.

The Gary expansion program started early this year. It is designed to raise output in order to keep pace with increasing Rambler production capacity.

Soon To Be—When in full operation, the larger facilities will allow for an increase in production capacity of Ramblers from 1400 to 2000 a day. Presently, for example, Rambler assembly at Kenosha, Wis., on a six-day, three-shift basis, is running just under 11,000 cars weekly.

Parts made at Budd's Gary facilities are shipped daily by rail to AMC's plants in Kenosha and Milwaukee. Between 80 and 110 sedan and station wagon underbodies can be stacked in a single 52 ft gondola. Units shipped on Monday, are on the Kenosha assembly line Wednesday.

At the current production rate, the Gary plant uses 585 tons of steel daily while running two eight-hour shifts and a skeleton third shift five days a week.

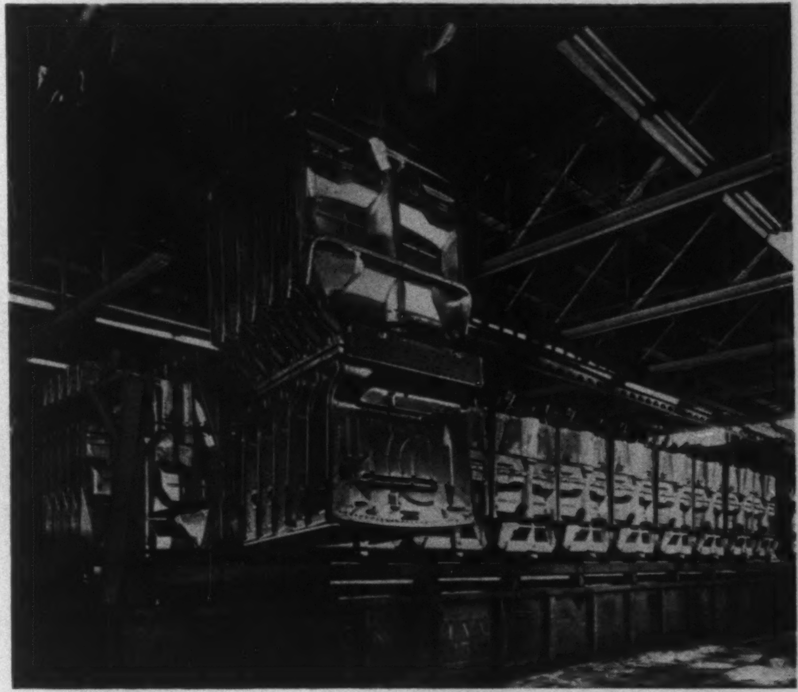
Scrappage rate now averages about 1.5 pct. For critical parts with many formations, such as a fender, the rate is 2 to 3 pct.

A New Wing—A major part of Budd's expansion program was construction of a 70,000 sq ft wing which brings the total floor area to more than 600,000 sq ft. This allows for expanded press and assembly floor areas, furnishes more storage area for finished components and provides space for two new railroad sidings to service the plant.

Key equipment includes a new 108 in. press line and modernized 132 in. and 180 in. press lines. With these additions the plant has 14 major press lines ranging in size from 74 to 200 in. Also installed are a fully mechanized 22 stage multi-welder and indexing conveyor underbody assembly line, overhead and semi-automatic welding setups and a high-speed decoiler and oscillating shear.

Thinking Expands Too—AMC is also expanding its thinking. In line with an industry trend, Rambler is using more galvanized steel this year than ever before. Its bodies now require approximately 500 tons of galvanized monthly.

And Budd officials feel certain the use of galvanized steel will increase on Ramblers as the industry fight against body corrosion grows.

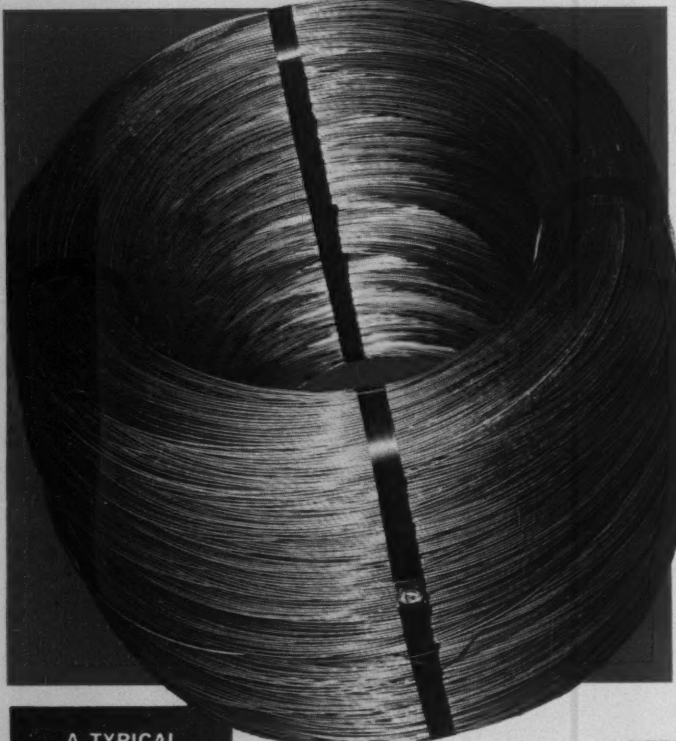


ALL ABOARD: As underbodies come off the automatic welding line at Budd Co.'s Gary, Ind., plant, they are loaded onto railroad cars.

Mr. Brite Wire Fabricator —rid yourself of these PROFIT PIRATES by switching to

EXCESSIVE DOWNTIME
COIL REMNANT SCRAP

DSC-PORTSMOUTH Long Production Run *LPR COILS



A TYPICAL HIGH DENSITY *LPR COIL

10 gauge, 2,210 lbs., —more than 8 miles of non-stop fabrication.

* LPR's can give you up to 40 miles of non-stop fabricating, depending on wire size.

Non-productive coil-change downtime and coil-remnant scrap losses "pirate" profits from fabricators who still have the "CMB"—*conventional mill bundle*—habit . . . Users who have switched to *LPR's find they can feed up to 28 times more wire per set-up—*in single length run*—eliminating up to 95% of production stoppages due to coil changes; reducing downtime and coil-remnant scrap in direct ratio.

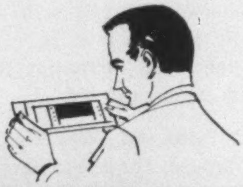
*LPR users experience other money-saving benefits too . . . loading time cut, overall man-hour costs reduced, storage space diminished, productivity increased . . . in fact, *each *LPR coil is a self-contained, cost-reducing, materials expediting system.*

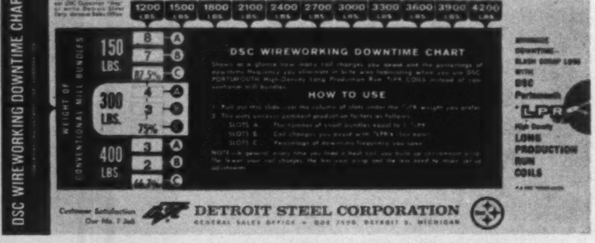
To learn more about how *LPR's can help you save wireworking time and money, call your nearest DSC customer "Rep" or write Detroit Steel Corporation, Box 7508, Detroit 9, Mich.

FREE

Send for your free copy of this new DSC Wireworking Downtime Slide Chart. It gives you, at a glance, percentage of downtime frequency you eliminate by using *LPR coils instead of 150, 300 and 400 lb. bundles. Please request, on company letterhead, from Detroit Steel Corp., Box 7508, (Room 311), Detroit 9, Mich.

HERE'S A NOVEL WAY TO "FIGURE" DOWNTIME SAVINGS




DSC WIREWORKING DOWNTIME CHART
WEIGHTS OF DSC-PORTSMOUTH LONG PRODUCTION RUN *LPR COILS
1200 LBS.
1500 LBS.
1800 LBS.
2100 LBS.
2400 LBS.
2700 LBS.
3000 LBS.
3300 LBS.
3600 LBS.
3900 LBS.
4200 LBS.
WEIGHT OF CONVENTIONAL MILL BUNDLES
150 LBS.
8 A
7 B
87.5% C
300 LBS.
4 A
3 B
75% C
400 LBS.
3 A
2 B
66.7% C
DSC WIREWORKING DOWNTIME CHART
HOW TO USE
DSC Portsmouth
*LPR
High Density
LONG PRODUCTION RUN COILS
Customer Satisfaction Our No. 1 Job
DETROIT STEEL CORPORATION

Performance Proved DSC®

DETROIT STEEL

Flat Rolled and Wire Products

Customer Satisfaction—Our No. 1 Job

Customer "REP" Offices in Principal Cities

*A DSC TRADE-MARK

Detroit Steel Corporation—General Sales Office: Box 7508, Detroit 9, Michigan

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'Men in Space' Era is Nearing

Space Expert Says it Can Now be Timetabled

Although space flight is still in the primitive stages, it has progressed to the point of timetabling.

Dr. John P. Nash of Lockheed Aircraft Corp. sees a manned orbital flight next year.—By R. R. Kay

■ Space flight is still in its primitive stages, but the near-future is clear. In fact, you can timetable it.

Many aerospace executives are confident the U. S. has the know-how to lick technical problems. And they're sure the money will be available.

Dr. John P. Nash is one of the leading men in aerospace thinking. He's Director of Research, Missile and Space Division of Lockheed Aircraft Corp., Sunnyvale, Calif. Here's his timetable of our future in space:

1961: The first manned orbital flight.

1962: An instrumented probe in the vicinity of Venus or Mars. And a launching of Saturn, a giant booster rocket.

1963 or 1964: First U. S. launch for a controlled landing on the moon.

1964: The first try for an unmanned space vehicle to circle the moon and return to earth. Also, a try at an unmanned reconnaissance of Mars or Venus.

1965 to 1967: Launchings aimed at manned around-the-moon flight. And setup of a near-earth space station.

1970 to 1980: A manned landing on the moon with a return to earth.

But much research and engineering is necessary before landing an exploration party on the moon. Dr. Nash is sure that this will happen in time for most of us to see it.

More Defense Dollars

Are you doing defense work for West Coast companies?

If so, it looks like more defense dollars—not less—are coming this way. That's the word from Dudley C. Sharp, Secretary of the Air Force.

But Mr. Sharp warns companies with defense contracts to do a better job of cost controlling. He's asking the Defense Dept. to report to him about any contractor showing sizable cost reductions.

Imports Raise Havoc

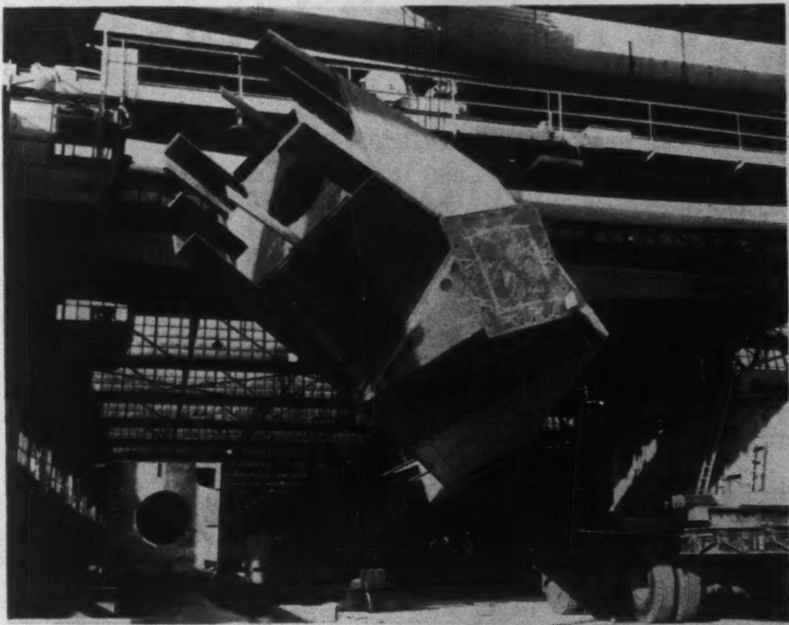
Foreign steel is raising havoc with West Coast steelmakers. So much so, that in some product lines imports dominate the market.

H. H. Fuller, vice president, Bethlehem Steel Corp., San Francisco, gives these examples:

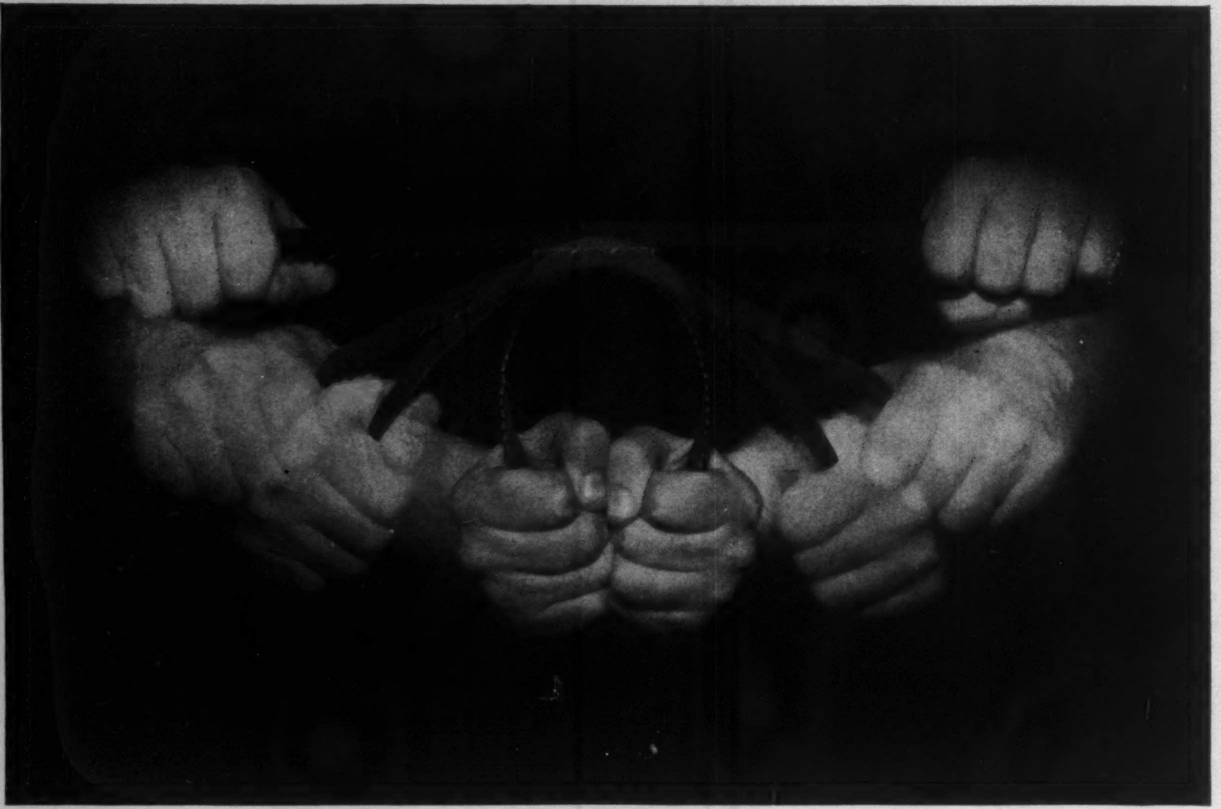
In California, 90 pct of the nails, 50 pct of the buttweld pipe, 40 pct of the wire rods, and practically all of the barbed wire are imports.

Reason: Lower prices. For instance, reinforcing rods made abroad undersell domestic rods by as much as $29 per ton.

One Step Closer to the Finished Product



AIRBORNE?: The last of four steel arches is lowered into place at the Los Angeles International Airport Passenger Terminal. The arches, each weighing 39 tons, were built by Kaiser Steel Corp.'s Montebello Fabricating Div. They will be the basic support for the structure.



So it doesn't break---*So what??*

So we can bend a MARVEL High-Speed-Edge Hack Saw Blade double, and it won't break. Does this prove anything?

Let's see if it does. When you buy a box of hack saw blades, you expect each blade to have a reasonable cutting life. For example, take an ordinary blade that costs $4.00, and you expect it to produce 2000 sq. inches of accurate cutting-off before it is discarded. Would you be willing to pay $8.00 for that same blade? *You will, if it breaks halfway through its expected life.*

Bending a MARVEL High-Speed-Edge Hack Saw Blade to demonstrate that it is truly unbreakable proves the point that you get every square inch of blade life you pay for when you buy MARVEL Blades.

Safety to both operator and machine, plus maximum blade life, seem like value enough from this remarkable blade. However, these MARVEL Blades give you even more, for they will cut faster, with greater accuracy because they can be safely tensioned more taut in your machine than ordinary "breakable" blades and are therefore more rigid to resist deflection.

Cost? Unbreakable MARVEL High-Speed-Edge Hack Saw Blades are priced competitively. Use MARVEL Blades consistently with complete confidence because they have no equal for value. Leading Industrial Distributors stock and sell MARVEL. Ask yours today.

ARMSTRONG-BLUM MANUFACTURING CO.
5700 West Bloomingdale Avenue • Chicago 39, Illinois

MARVEL *Metal Cutting* SAWS
Better Machines—Better Blades

Expect Order Upturn This Month

Orders were down and cancellations were up for machine tools in September.

But builders say November and December will tell if the machine tool exposition is going to pay off.—By R. H. Eshelman.

■ Machine tool builders are looking for an upturn in new orders in November and December. The reason: Builders are banking on the time-lag between the September machine tool exposition and actual order placing by customers to boost fourth-quarter new order books.

"Business in the fourth quarter of 1960 should be the best the industry has had in a long time," says Alan C. Mattison, president of the National Machine Tool Builders' Assn.

Profit Squeeze—Added to the interest created by advanced machine tools displayed at the show, is the current drive by manufacturers to lower production cost. The profit squeeze is forcing many to modernize or lose out in domestic and foreign markets.

No one is more conscious of the squeeze on profits than the builders themselves. One of the biggest threats to their profit outlook is the possibility of the government's extending the provisions of the Walsh-Healy public contracts acts throughout the industry.

This would saddle the industry with a high minimum-wage just at the time when it is facing a declining market at home, and a stepped-up effort by foreign competitors, for domestic and world markets.

Orders Down—New orders in September from domestic buyers fell below those of August. Foreign buyers, however, came into the market in September with the highest volume of orders this year.

As yet, no data has been collected on the amount of new machine tool orders placed in October. But it is generally conceded that October was still too early to reflect buying decisions of visitors to the tool exposition.

Cancellations Up — Of greater concern to the machine tool builders at their annual meeting last week was the sharp rise in order cancellations in September. Cancellations of domestic new machine tool orders hit a whopping $6.5 million for the month.

The main reason reported for the drop was the pulling back of automakers plans to tool for aluminum engines for 1962 standard size cars.

The European market, too, shows some signs of tapering off. European automakers have cancelled some expansion programs. And the economy of Western European countries has lost some of its vigor.

How Much Help?—Any serious drop in the European economy could cut backlogs of foreign machine tool builders and cause them to seek new orders more actively in the U. S.

National Machine Tool Builders' Assn. Elects Officers

ELECTION WINNERS: National Machine Tool Builders Assn. last week elected these men to the following positions for 1961 (left to right): President, Everett M. Hicks, Norton Co.; first vice president, Francis J. Trecker, Kearney & Trecker Corp.; second vice president, Wallace E. Carroll, American Gage and Machine Co.; treasurer, Lawrence C. Gleason, Gleason Works; and director, B. F. Olson, Sundstrand Corp.

INDUSTRIAL BRIEFS

City Hall—The erection of stainless steel framing and curtain walls is underway for what is said to be the first City Hall in the U. S. to feature stainless steel so extensively. The stainless is destined for Canton, O.'s new $3.5 million City Hall scheduled for occupancy in March, 1961. Nearly 50,000 lb., or 25 tons, of stainless will be used for the eight-story structure.

Modern Expansion—Two expansion programs are under way at Allis-Chalmers tractor group plants. The construction of two additions are nearing completion at A-C.'s Independence, Mo. Works. At the Harvey, Ill. Works, ground has been broken for a multi-million dollar engine plant. An IBM 305 remote access memory accounting control machine will give A-C tractor shop personnel fingertip control of production, service and material control records.

Good Reading—A new U. S. Dept. of Commerce publication, Directory of National Associations of Businessmen: 1960, is now available. It contains data on over 2000 national associations. Copies are available at 50 cents from the Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

Big Complement — Columbia-Southern Chemical Corp. will soon start construction of facilities for certain chrome chemicals at Corpus Christi, Texas. This multi-million dollar plant will complement Columbia-Southern's present facilities for chrome chemicals at Jersey City, N. J.

Big Move—Mathews Conveyer Co., Ellwood City, Pa., has purchased the Tobert Co., Lansing, Mich., which engineers and manufactures LIVE-FLO oscillating conveyers. All of the Tobert manufacturing operations will be moved to the Ellwood plant of Mathews. The units will be sold by both of the Company's subsidiaries at San Carlos, Calif., and Port Hope, Ontario, as well as the parent company.

Research Zoning—The Pfaudler Co., Div. of Pfaudler Permutit Inc., plans to build a $75,000 research and development center. The company will build in Henrietta, a suburb of Rochester, N. Y., providing a selected site is rezoned for industrial use. Pfaudler hopes to break ground this Spring and occupy the center by Fall of 1961.

Rare Place — Linde Company, Div. of Union Carbide Corp., has opened a new warehouse at 7 South Linden Ave., South San Francisco, Calif. The warehouse will supply rare gases and special rare gas mixtures to industry in the far West area. These gases were previously available only from Linde's Tonawanda, New York, plant.

Number Three—Hodag Chemical Corp., Skokie, Ill., is now undergoing its third major plant expansion since 1954. Each of these expansions has more than doubled the production capacity of the suburban Chicago manufacturer of surface active chemicals. Hodag has also purchased additional land adjoining the present plant site for planned future expansion.

So Big—C&S Products Co., Inc., an affiliate of Barber-Green Co., Aurora, Ill., will have a 3200 sq ft addition to their Detroit plant and offices. The new building provides facilities for expanded engineering and accounting departments and makes available additional manufacturing space.

New Member—James B. Clow & Sons, Inc., Chicago, has purchased the Streator Drain Tile Co., Streator, Ill. The transaction involves about $2.5 million. Although Clow has been in the cast iron pipe business since 1878, this is the first time that Clow has entered the tile pipe field. The Streator Company will be operated as the third Clow wholly-owned subsidiary.

Tool, Die Assn. Elects New Officers

VOTE-GETTERS: Elected officers of the National Tool, Die & Precision Machining Assn. for 1960-61 are (left to right): J. D. Dewhurst, first vice president, Arrow Tool Co.; F. D. Wright, secretary, Fred D. Wright Co. Inc.; E. W. Barnwell, second vice president, Apex Corp.; H. G. Murdock, president, Arrowsmith Tool & Die Corp.; Rolf H. Berg, treasurer, Atols Tool & Mold Corp. and C. H. Bender, newly appointed executive secretary of the association.

ANNOUNCING A NEW VANADIUM-ALLOYS DEPARTMENT FOR TOOL AND SPECIAL STEELS IN

cast to shape FORM

A brand new, completely equipped department for Cast-to-Shape tool and special steels—conventional sand casting or precision casting by the Shaw Process or shell molding—varied melting furnace capacity of 30 pounds, 300 pounds, 1000 pounds and 2000 pounds for flexibility in the casting of special analyses with maximum economy and service to our customers.

STANDARD GRADES	FORMEX—a 5% chrome hot work die steel. AIREX—a 5% chrome cold work, air hardening die steel. CROMEX—a 12% chrome cold work die steel.
SPECIAL COMPOSITIONS	Available to customer specifications.
TYPICAL APPLICATIONS	Forming rolls, cams, drop forge trimming dies, forming or blanking dies, molds, draw rings.

For sound castings of closely controlled chemical analysis, and to insure uniformity in machining and heat treating, come to VANADIUM-ALLOYS STEEL COMPANY.

50th Anniversary

FIRST QUALITY TOOL & SPECIAL STEELS

VA

1910-1960

VANADIUM-ALLOYS STEEL COMPANY

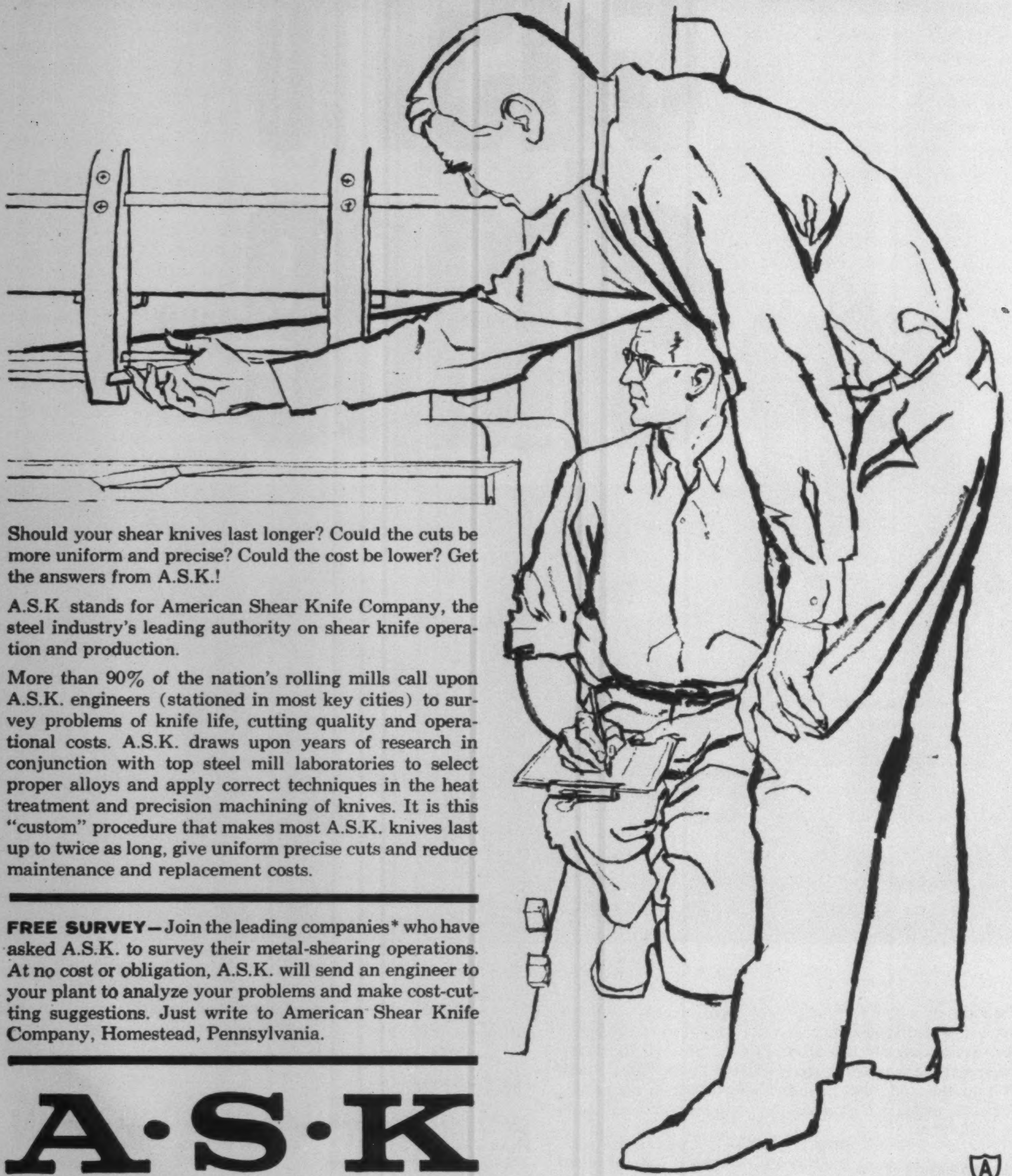
GENERAL OFFICES: LATROBE, PA.

DIVISIONS: Anchor Drawn Steel Co. • Colonial Steel Co. • Metal Forming Corporation • Pittsburgh Tool Steel Wire Co. • Vanadium-Alloys Steel Co.

SUBSIDIARIES: Vanadium-Alloys Steel Canada Limited • Vanadium-Alloys Steel Societa Italiana Per Azioni • **EUROPEAN ASSOCIATES:** Societe Commentryenne Des Aciers Fins Vanadium-Alloys (France) • Nazionale Cogne Societa Italiana (Italy)

Can you get more wear from your shear knives?

A·S·K for the answer!



Should your shear knives last longer? Could the cuts be more uniform and precise? Could the cost be lower? Get the answers from A.S.K.!

A.S.K stands for American Shear Knife Company, the steel industry's leading authority on shear knife operation and production.

More than 90% of the nation's rolling mills call upon A.S.K. engineers (stationed in most key cities) to survey problems of knife life, cutting quality and operational costs. A.S.K. draws upon years of research in conjunction with top steel mill laboratories to select proper alloys and apply correct techniques in the heat treatment and precision machining of knives. It is this "custom" procedure that makes most A.S.K. knives last up to twice as long, give uniform precise cuts and reduce maintenance and replacement costs.

FREE SURVEY—Join the leading companies* who have asked A.S.K. to survey their metal-shearing operations. At no cost or obligation, A.S.K. will send an engineer to your plant to analyze your problems and make cost-cutting suggestions. Just write to American Shear Knife Company, Homestead, Pennsylvania.

A·S·K

AMERICAN SHEAR KNIFE

**names supplied on request*

L. S. Brock, appointed president, United States Steel Products Div., U. S. Steel Corp.

The Wallingford Steel Co.—**W. H. Grinold,** elected president.

Magnus Metal Corp. — **B. H. Sullivan, Jr.** and **R. G. Altizer,** appointed vice presidents; **L. J. Gruber,** appointed asst. vice president; **J. J. Hickey,** appointed Chicago district sales manager.

Buhr Machine Tool Co.—**H. C. Daum,** appointed vice president, sales.

Kaiser Industries Corp. — **J. L. Hallett** and **L. H. Oppenheim,** appointed vice presidents; **F. T. Matthias,** appointed vice president, Henry J. Kaiser Co.

Pittsburgh Plate Glass Co.—**J. T. Owens,** elected vice president; **C. V. Anderson,** elected associate general counsel.

Waltham Precision Instrument Co.—**Forbes Morse,** elected a vice president.

Budd Electronics Inc. — **Robert Young,** appointed president and general manager.

Van Straaten Chemical Co. — **Dr. G. E. Barker,** named vice president and director, research.

Hooker Chemical Corp.—**Dr. C. A. Stiegman,** elected vice president, research and development; **C. C. Hornbostel,** elected vice president, finance.

Acoustica Associates, Inc. — **R. B. Houghton,** appointed vice president, engineering, California operations.

Instrument Development Laboratories, Inc.—**E. T. Connor,** named vice president, marketing.

The Milford Rivet & Machine Co. — **D. W. Clark,** appointed general sales manager.

National Roll & Foundry Div., General Steel Castings Corp.—**J. W. Russell,** promoted to asst. works manager, Avonmore, Pa.

Falk Corp.—**D. T. Hanbery,** appointed manager, new Minneapolis district office.

J. R. Zappa, named superintendent, Union Drawn Steel Div. plant in Los Angeles, Republic Steel Corp.

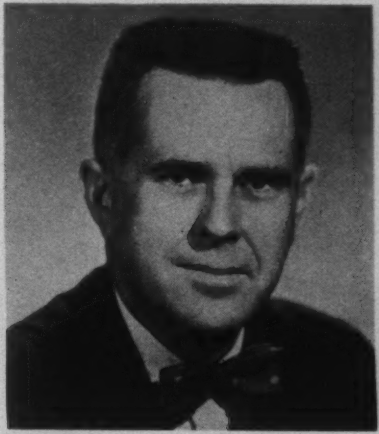
Norton Co., Abrasive Div. — **W. A. Vagedes,** appointed Cleveland district manager.

Hewitt-Robins Inc.—**R. S. Kelly,** appointed chief engineer, Los Angeles regional office.

Clearing Div., U. S. Industries, Inc. — **George Herrick,** appointed general sales manager, automotive sales; **Philip Delmer,** appointed general sales manager, domestic sales; **Louis Tuglas,** appointed manager, shear sales; **Dave Bonnar,** ap-

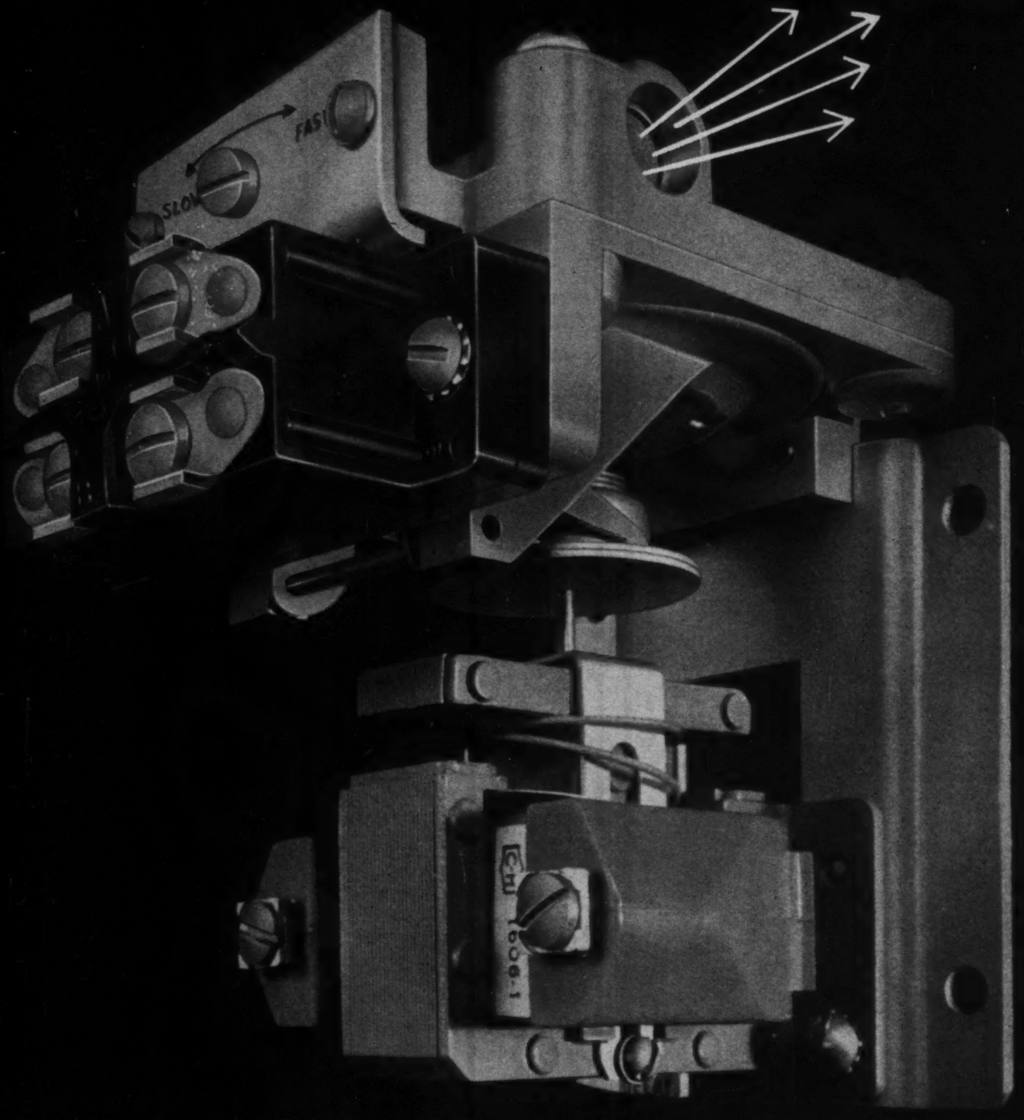
W. I. Wilt, becomes vice president, marketing, The Sheffield Corp.

B. M. Korn, elected treasurer, American Steel Foundries.

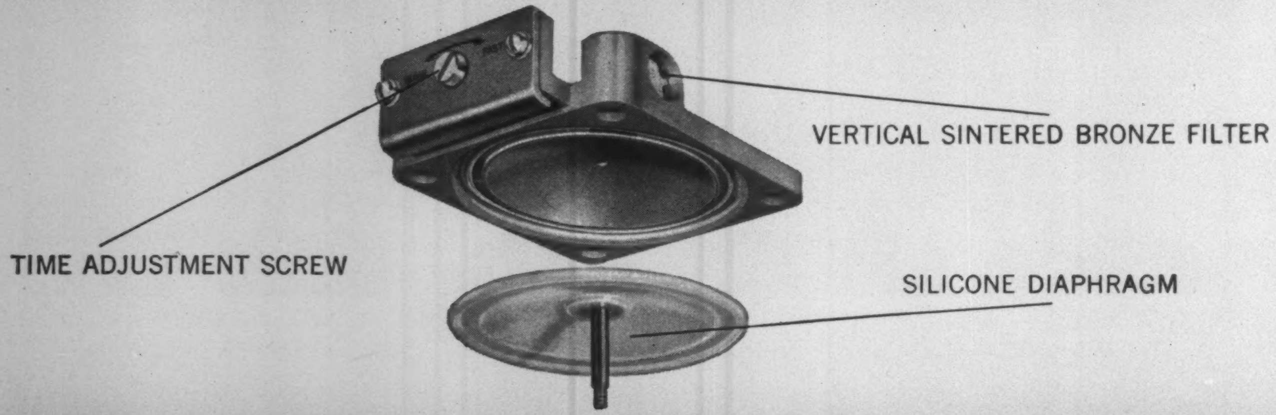


S. M. Vermeil, elected secretary, Keystone Steel & Wire Co.

NO CHECK VALVE! Air cleans filter as it exhausts through the vent. No check valve to clog and cause trouble.



EXPLODED VIEW SHOWS HOW NEW DIAPHRAGM DESIGN ELIMINATES CHECK VALVE


VERTICAL SINTERED BRONZE FILTER
TIME ADJUSTMENT SCREW
SILICONE DIAPHRAGM

CONTROL

New! A Cutler-Hammer one-minute pneumatic timer that eliminates the troublesome check valve!

Unique diaphragm design makes timer more accurate and dependable than any other

The new Cutler-Hammer one-minute Pneumatic Timer, by eliminating the conventional check valve, does away with failures caused by dust.

Using a silicone diaphragm, this timer pulls fresh air in through a filtered vent, and on the exhaust stroke blows away any dust that may have collected on the surface of the filter. No chance for dust to affect accurate timing or make the timer inoperable. The silicone diaphragm works equally well 150°F above zero or 45°F below zero.

No other timer is more accurate. It adjusts easily from .2 seconds to 60 seconds with a 7½-turn screw that provides precise adjustment to the desired time setting. All you need is a screwdriver. And, it can be changed from "on delay" to "off delay" in seconds. Smallest electrical dimensions of any one-minute timer, too. Call your Cutler-Hammer distributor for full details or send for Publication L071-W246.

What's new at Cutler-Hammer?

You can see the big change at Cutler-Hammer wherever you look. New, better products. New, expanded engineering staff and facilities. New added plant capacities. All done to help you meet the big opportunities of this decade.

If you're planning ahead, we'd like to show you how our talents and experience in electrical control could help you. Contact the nearest Cutler-Hammer sales office.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

CONTROL

(Continued from P. 153)

pointed manager, dealer press sales, and **Dean Cochran,** named manager, hydraulic sales; **Stephen Miller,** appointed manager, machine tool sales.

F. A. Baker, Jr., named chief engineer, Steel Div., Bethlehem Steel Co., Bethlehem, Pa.

Zero Manufacturing Co., Magnesium Div.—**H. P. Dunne,** named marketing director.

American Manganese Steel Div., American Brake Shoe Co.—**H. B. Reinhardt,** named eastern sales manager.

I-T-E Circuit Breaker Co.—**G. W. Geiger,** named manager, Portland, Ore. new district sales office; **W. V. Knowles,** named manager, new district sales office, Seattle, Wash.

P. H. Ponta, appointed director, Manufacturing Engineering & Development Office, manufacturing staff, Ford Motor Co.

P. M. Nash, appointed manager, Mound Road Engine Plant, Chrysler Corp.

The Black & Decker Manufacturing Co., Product Service Div.—**C. L. Costa,** appointed field manager.

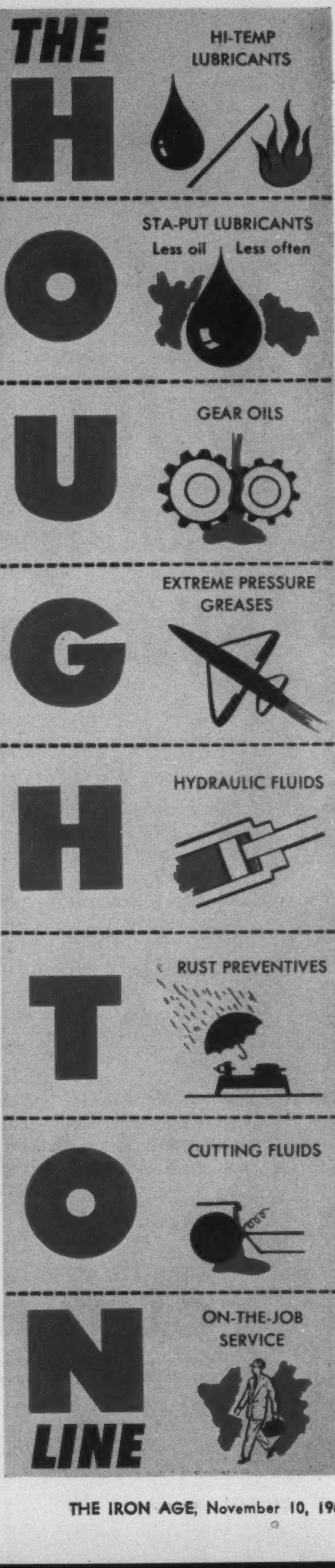
Central Operations Div., U. S. Steel Corp. — **W. F. Nagel, Jr.,** appointed manager, tin plate metallurgy.

Allis-Chalmers Mfg. Co.—**J. L. Desmond,** appointed works manager and **W. A. Kulberg,** as manager, industrial and community relations, Boston Works.

G. A. Heckscher, named asst. vice president, New Business Dept., United Engineers & Constructors Inc., Philadelphia.

Union Drawn Steel Div., Republic Steel Corp.—**J. G. Coffey,** appointed plant service manager, Los Angeles; **R. A. Creter,** to plant

(Continued on P. 158)



THE
H
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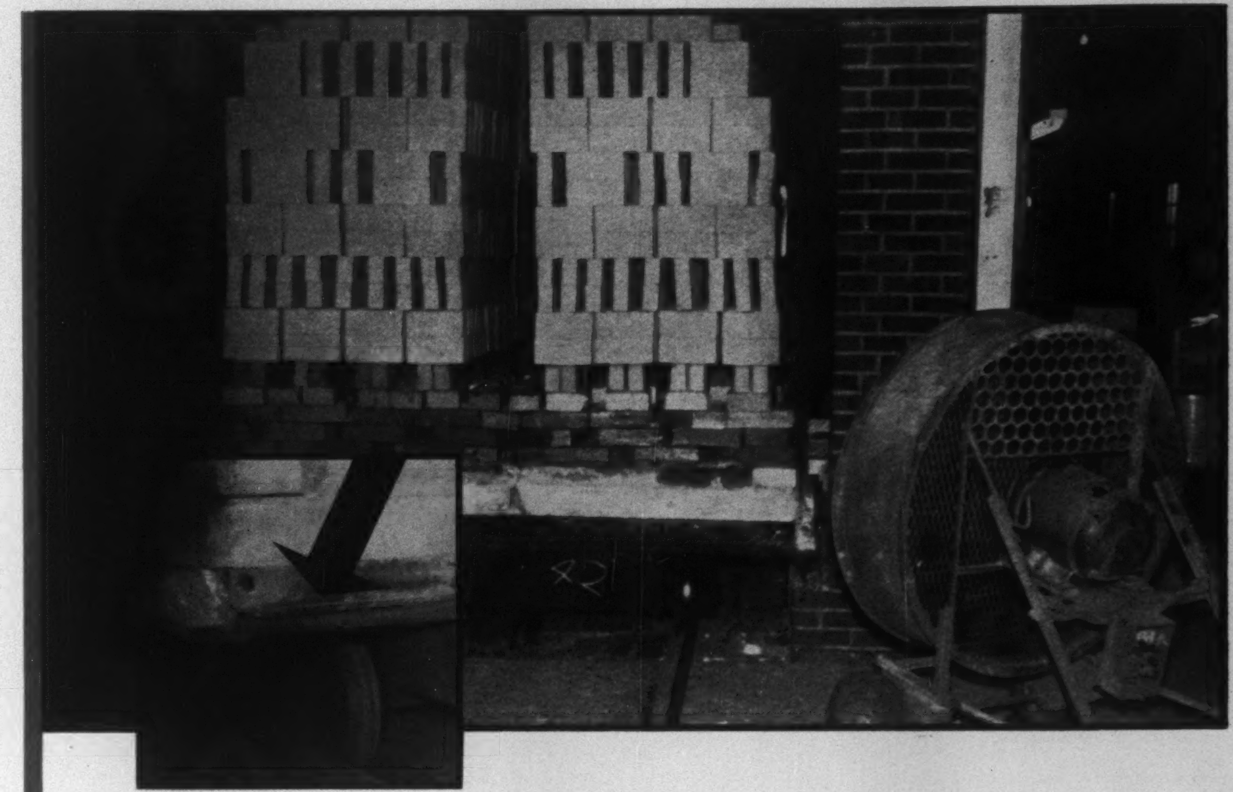
LINE
HI-TEMP LUBRICANTS
STA-PUT LUBRICANTS
Less oil
Less often
GEAR OILS
EXTREME PRESSURE GREASES
HYDRAULIC FLUIDS
RUST PREVENTIVES
CUTTING FLUIDS
ON-THE-JOB SERVICE



to keep wheels turning at 1000°F. . . .

(and below-freezing too!)

USE HI-TEMP 2409!

Conventional bearing lubricants frequently break down or clog when kiln cars shuttle between super-heated ovens and outside winter temperatures. And "frozen" bearings carrying 20,000 lbs. of bricks are death on production schedules and expensive to repair or replace. This happened on the cars you see here.

After cleaning the bearings and flushing grease passages on the two cars, Houghton's Hi-Temp 2409 was applied. Three weeks later (after three 82-hour cycles) Hi-Temp 2409 was still effective and lubrication lines were completely free. Subsequent checks showed washer ring life had been greatly extended, and hydraulic pressure (needed to move cars) had dropped from 700 to 500 psi.

If you have a high temperature lubrication problem, Houghton's new Hi-Temp 2409 may be the answer. Your Houghton Man can tell you . . . or suggest a better solution. E. F. Houghton & Co., 303 W. Lehigh Ave., Phila. 33, Pa.

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E. F. HOUGHTON & CO.

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For
Quality
and
Economy
Use

MALLEABLE

For Service Contact...

CONNECTICUT
Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company,
Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division
Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members
of the Malleable Castings Council

(Continued from P. 156)

metallurgist and field contact metallurgist, West Coast area.

Frauenthal Div., The Kaydon Engineering Corp.—**H. R. Dobb,** appointed sales manager.

C. H. Smith, named manager, sales engineering, Canton Div., E. W. Bliss Co.

Reynolds Metals Co.—**J. E. Barron,** appointed manager, residential building products market.

The Cincinnati Milling Machine Co., Cincinnati Milling Products Div.—**C. E. Reichel,** named Chicago district sales manager; **G. E. Parker,** appointed asst. Sales manager of the Division.

Hubbard & Co. — **William Featherstone,** appointed product sales manager, West Coast Div.

E. C. Walter, appointed manager, Detroit plant, Wolverine Tube, Div. of Calumet & Hecla, Inc.

W. B. Clark, named manager, manufacturing engineering, Norma-Hoffmann Bearings Corp.

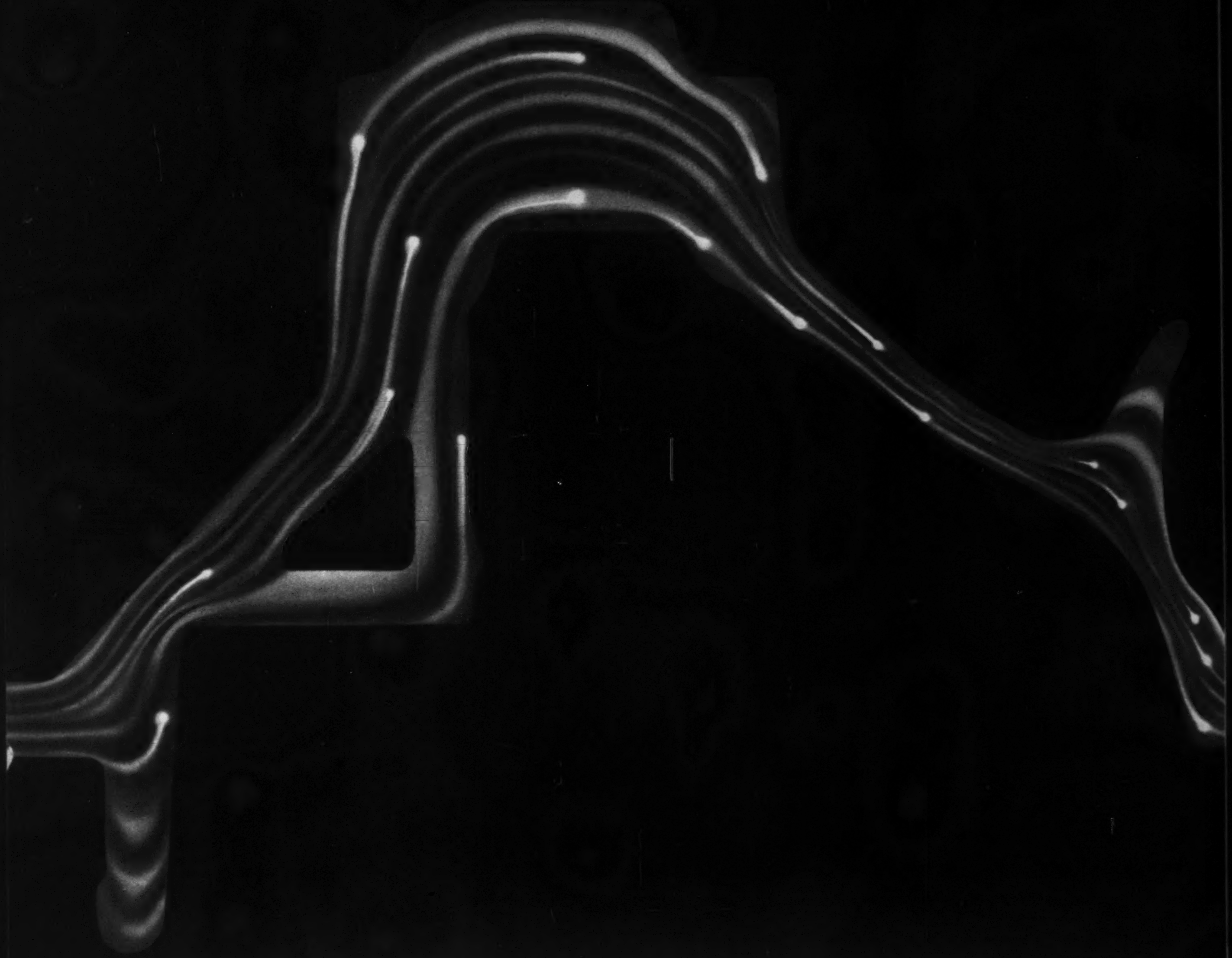
The Sheffield Corp. — **Richard Chaney** and **Edgar Hakanson,** named marketing managers; **Walter Burkart,** promoted to manager, Machine Tool Div.

The Babcock & Wilcox Co. — **A. S. Harries,** appointed refractories sales representative, Pittsburgh district sales office.

Automatic Transportation Co. — **H. L. Tygesson,** appointed general sales manager.

V. A. Zatell, appointed manager, Inkster, Mich., plant, Wolverine Tube, Div. of Calumet & Hecla, Inc.

Columbia - Southern Chemical Corp.—**C. W. Hoskins,** appointed supervisor, control laboratory of the barium chemicals plant at S. Charleston, W. Va.



Liquid flow through a cross section of a Malleable differential carrier.

For Performance-Tested Dependability . . . Use Malleable

Molten metal flows evenly into all parts of the mold, then solidifies into pre-shaped parts with uniformly dependable properties throughout. Malleable iron castings will stand up under extremes of tension, impact, torsion, shear, fatigue, wear, heat, cold, and corrosion. They also offer maximum economy, are easy to work, and are versatile enough for parts ranging from a few ounces to hundreds of pounds.

The more manufacturers know about Malleable castings, the more they use Malleable to improve quality and increase profits. Get the full story on Malleable . . . Contact any of the progressive companies that display this symbol —

MEMBER
MALLEABLE
CASTINGS COUNCIL

For details on Malleable's uniformity and reliability contact any company listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

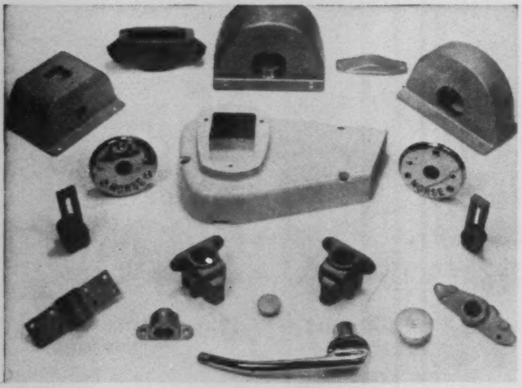
TOCCO* Induction Heating

melts bronze, aluminum and stainless steel for high-precision, porous-free castings

Morse Instrument Company, Hudson, Ohio, manufacturer of marine hardware and control instruments, recently switched from conventional furnaces to TOCCO Induction Melting. Results: greater speed, better working conditions and, above all, purer, sounder castings.

"Castings are free from porosity since we switched to TOCCO Induction Melting," reports president John Morse. "This is a sales advantage to us and a tremendous quality advantage for our customers."

Whether you're interested in melting ferrous or non-ferrous metals, TOCCO Induction Melting offers you these important advantages:



Sample castings produced by Morse Instrument Company with new shell molding process and TOCCO Induction Melting.

- **Stepless Power Control**
- **Extremely Rapid Melting**
- **High Efficiency—Even on Intermittent Operation**
- **Good mixing because of Natural Agitation**
- **Extremely Low Alloy Loss**
- **No Contamination when Composition of Charges is Changed**
- **High Reproducibility of Results**
- **Minimum Space Requirements**
- **No Special Installation Charge**
- **Simple, Safe Operation**
- **Clean, Comfortable Working Conditions**
- **No Carbon Pick-up**

If any of these advantages suggest economies in your operations, write for full details—no obligation, of course.

TOCCO
JUST PUSH A BUTTON
*Trade Mark Reg. U.S. Pat. Off.

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Please send copy of "The Case for TOCCO Induction Melting".

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Position______________________________

Company______________________________

Address______________________________

City____________________ **Zone**______ **State**__________

NEW BOOKS

"Standard Metal Directory," divided into four sections, embraces iron and steel works; ferrous and nonferrous metal foundries; rolling mills and smelters and refiners of nonferrous metals. The book contains more than 12,000 detailed reports on steel mills, foundries, smelters and other plants. The reports give the name of the company, its capitalization, location of plants, plant equipment and capacity. Products manufactured are also included. 650 pages. $15.00. Bardeen Press, 425 W. 25th St., New York 1.

"Physical and Mechanical Properties of the Cobalt-Chromium-Tungsten Alloy WI-52" presents details on specifications and names of the alloy, chemical composition, fabrication, oxidation resistance, physical and mechanical properties. WI-52 was developed for gas-turbine components that require high-strength properties in the 1000°-2000°F temperature range. It has been used primarily as a first-stage turbine vane. Thus, it has supplanted the older X-40 (HS 31) alloy. Above 1800°F, WI-52 serves in applications that depend upon resistance to thermal shock, fatigue and oxidation. The newcomer is available only in the form of castings. 21 pages. $0.50. Office of Technical Services, (report PB 161216), U. S. Dept. of Commerce, Washington 25, D. C.

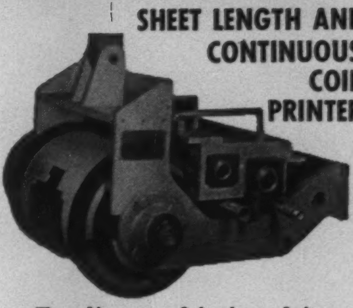
"Fatigue of Aircraft Structures" is a symposium that provides an important link between research and design applications. Ever at the elbow of the aircraft structural designer is a bogie—fatigue damage. Much has been uncovered about the nature of fatigue cracks. Much still remains unknown. What, for example, is the cumulative effect of stress cycles of random amplitudes? In the absence of a rational answer to this question, how do you design for a specific part? And how do you use the results? What makes a crack propagate? What kinds of cold-working treatments are most effective in parts subjected to fretting? Researchers continue to nibble away at the edges of these unknowns. But, in the interim, engineers must continue to build serviceable airplanes. The papers in this volume range from basic discussions to general philosophies of design. 138 pages. $4.00. American Society for Testing Materials, 1916 Race St., Phila. 3.

"Getting and Holding Your Executive Position," by Leon Davis Eldot, contains guides for executive command. The book is an outgrowth of a comprehensive study of the basic conflicts that arise in corporate-executive relationships. It is also based on the sincere desire to erase the difficulties confronting executives in transition. $4.95. Prentice - Hall, Inc., Englewood Cliffs, N. J.

"Energy from Uranium and Coal Reserves" summarizes the domestic and world uranium reserves and resources. Also included is a summary of the recoverable coal reserves. The report compares the maximum heat energy from the uranium and coal reserves. 7 pages. $0.50 each copy. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

"Techniques of Plant Maintenance and Engineering—1960," by Clapp and Poliak, Inc., answers all the questions asked from the floor of the Plant Maintenance and Engineering Conference held in Philadelphia earlier in the year. The book reflects the growing importance of maintenance and engineering functions in industry. It reveals the approach by industry to the key production problem of keeping plants and machinery at optimum efficiency. The book also contains reprints of the 34 papers presented at the 1960 conference. Nearly 2000 practical, everyday problems are discussed and analyzed, with corrective solutions given. 341 pages. $10.00 per copy. Clapp & Poliak, Inc., 341 Madison Ave., New York 17.

MATTHEWS
PRODUCT PRINTERS



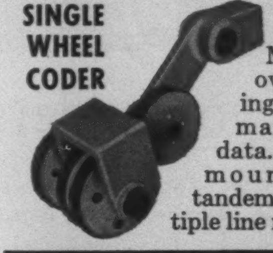
SHEET LENGTH AND CONTINUOUS COIL PRINTER

For line or friction drive continuous marking . . . or electronic control for spot printing.

MULTI-WHEEL PRINTERS

Hand rollers or in-line units for continuous overall sheet marking

SINGLE WHEEL CODER



Mounted over moving stock to mark code data. Can be mounted in tandem for multiple line marking.

PORTABLE PRINTERS

For Bar and Tube Marking, any diameter.

Light weight —rugged.

Complete line of inks and printing dies for every use.

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Can you understand this man's hunger for Tools?

Without them he's useless—a burden to himself and the earth. ■ With tools in his hands—a spade, a hoe, a trowel, a rake—he could raise food enough for his own family and perhaps other hungry villagers. ■ But for this man and countless others like him in Greece, in India, in Latin America and other desperately poor areas—the simplest steel implements are beyond reach. They cost too much. So millions of acres are barely scratched...with forked sticks or wooden ploughs...and two-thirds of the world's people still go to sleep hungry. ■ Will you help them till the fertile earth...through CARE? Wherever possible, CARE food distribution is coupled with a tools-for training program that enables men and women to become self-supporting. The need was never greater, the rewards never richer. ■ *Will you buy an extra tool*—to put into hands hungry for work, food, and dignity? ■ Send dollars to CARE, New York 16.

CARE

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AMERICAN RELIEF
EVERYWHERE, INC.
660 FIRST AVE.
NEW YORK 16, N.Y.

Here is $________ for food ☐ tools ☐
books ☐ medicine ☐ CARE's choice ☐
(PLEASE MAKE CHECKS PAYABLE TO CARE, INC.)

NAME________________________

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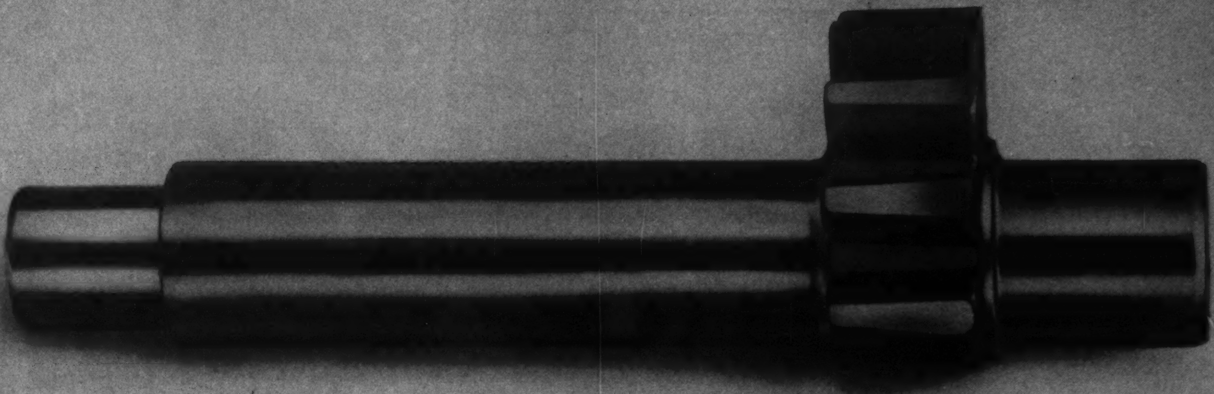
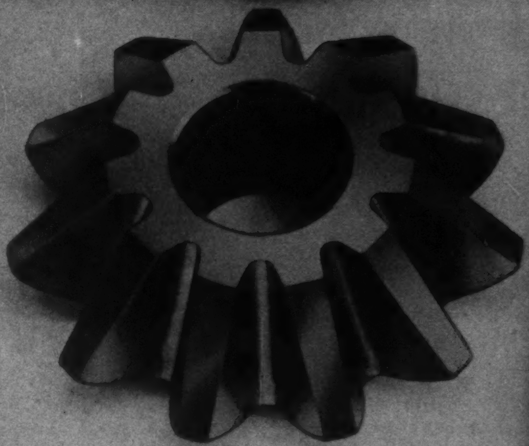
(Space donated by The IRON AGE)





THE Gleason Revacycle® method and its machine present the fastest way known for cutting precise straight bevel gears.

The Revacycle cutter holds roughing, semifinishing, and finishing blades. One revolution of the cutter completes a tooth space in 2.5 seconds. In fact, on smaller pieces, you can complete as many as four tooth spaces with a single cycle . . . that's less than ½ second per tooth!

This completely automatic Gleason machine can frequently replace a tandem of roughing and finishing machines . . . thereby saving considerably on capital investment.

Best of all, to get this speed and economy you need sacrifice nothing in accuracy. The Revacycle method produces localized tooth bearing which permits any practical assembly tolerances while avoiding load concentration at the ends of the teeth. And, you get exact reproduction piece after piece, day after day.

The machine accepts a wide range of work: diameters up to 10″ at a 5 to 1 ratio and face widths up to 1.25″.

For complete background and data, write for a bulletin. Gleason engineers will help you with details on any specific applications.

How to cut a bevel gear tooth in 2.5 seconds

1.2 SECONDS **is all it takes to dechuck a finished piece and chuck in a new blank with the automatic loading attachment on the 109 Revacycle Machine.**

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

THE
PENNSYLVANIA PLAN:
100%
financing
for your
new plant

Complete financing for Lease-Purchase of a new plant is available in labor-surplus areas of Pennsylvania through combined efforts of lending institutions, non-profit community organizations and the Pennsylvania Industrial Development Authority. Interest as low as 2%, with deferred amortization, can be applied on up to one-half of total plant cost.

100% financing is also available in other areas of the State, provided by community organizations, banks, insurance companies and other sources. You select the community you want. You specify plant construction details or choose one of several plant "shells" now being readied for completion.

100% Financing at a Glance . . .
Industrial Plant Construction Costs—

Subscribed by local non-profit community sponsored builder-owner corporations.	*20%*
2nd Mortgage Loan, Pennsylvania Industrial Development Authority.	*30%*
1st Mortgage Loan obtained from banks, insurance companies and similar lending institutions.	*50%*
Total financing, secured through local subscriptions and mortgage loans, without cash investment by the manufacturer.	*100%*

PENNSYLVANIA
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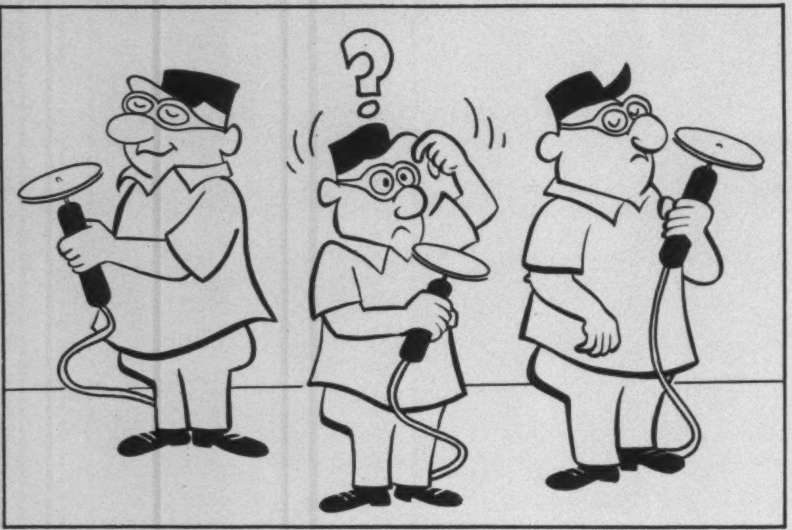
For free copy of "Plant Location Services" pamphlet, or for details on 100% financing, write or call:

Pennsylvania Department of Commerce
South Office Building
989 State Street, Harrisburg, Pa.
Phone: CEdar 4-2912

YOU ARBITRATE IT!



A Matter of Skill

▪ Under union contract in a manufacturing plant, a senior employee had the right to avoid layoffs by bumping any man with less seniority, "provided he has the skill and ability to perform the work involved.

When William C. tried to bump into a foundry grinder's job, a dispute arose. Management didn't want to give him a trial period. Finally, it agreed. But, it instructed everyone in the department that he was to be helped only by the foreman. After William did a rather poor job of a difficult piece of work, he was laid off as unqualified.

Trial by Ordeal—William thereupon filed a grievance. "That wasn't a fair trial," he protested. "You gave me a tougher job than any other new man would get and you didn't let me get the help I was entitled to."

"The only thing we have to do is let you work at a job you're competent for," answered the foreman. "The contract doesn't say we have to teach you a new trade."

The case went to an arbitrator under the rules of the American Arbitration Assn. How would you rule?

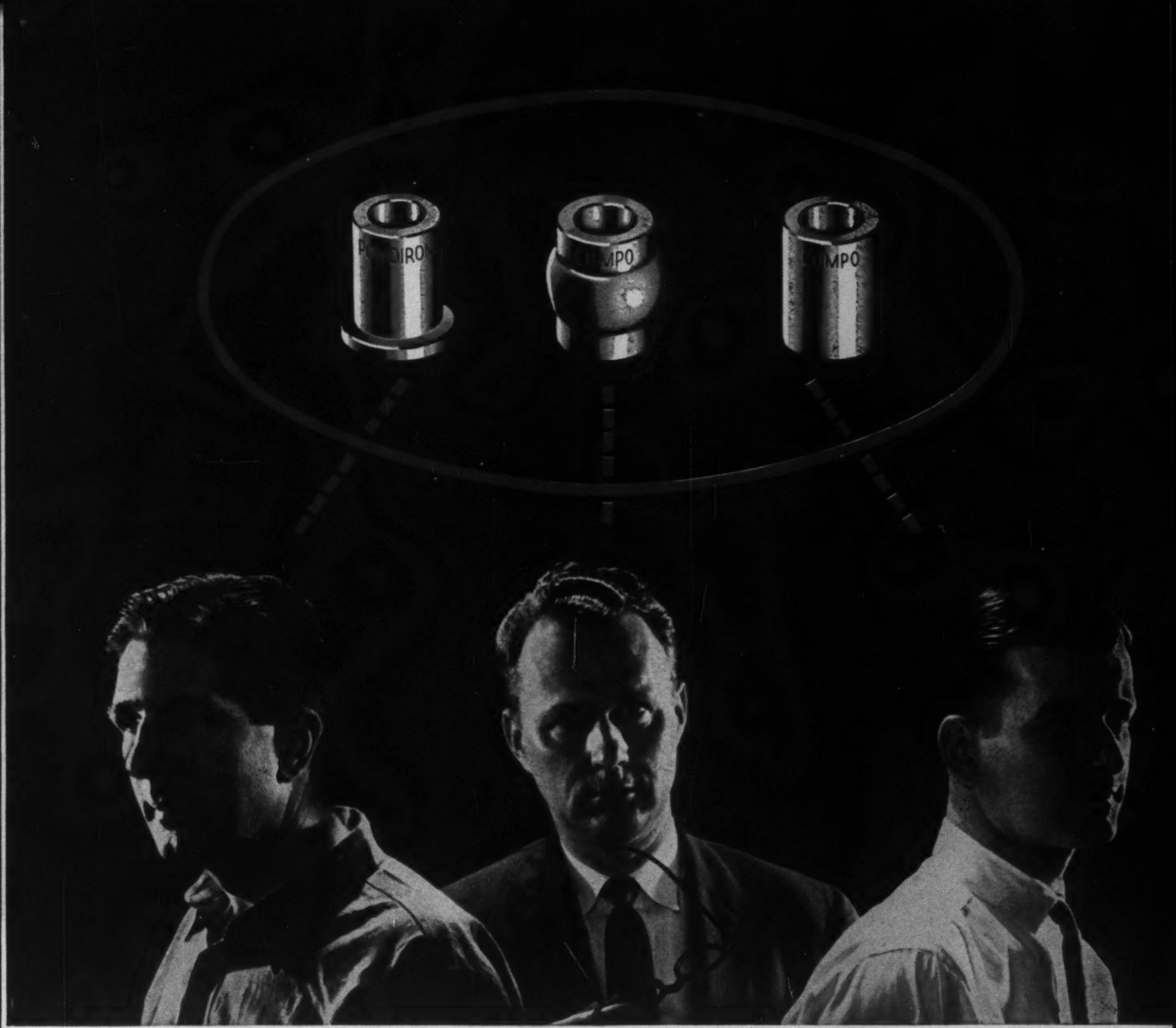
The Arbitrator Ruled:

Under the contract as interpreted and applied in the past, William "was entitled at least to the same opportunity that would be afforded a brand-new employee coming into the job." He pointed out that a new man would be permitted to get help and advice from anyone who was handy, not just his foreman. Since William was forbidden to get such help, he was entitled to a new two-week trial period under fair conditions.

From the files of
The American Arbitration Association

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the December 8 issue.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

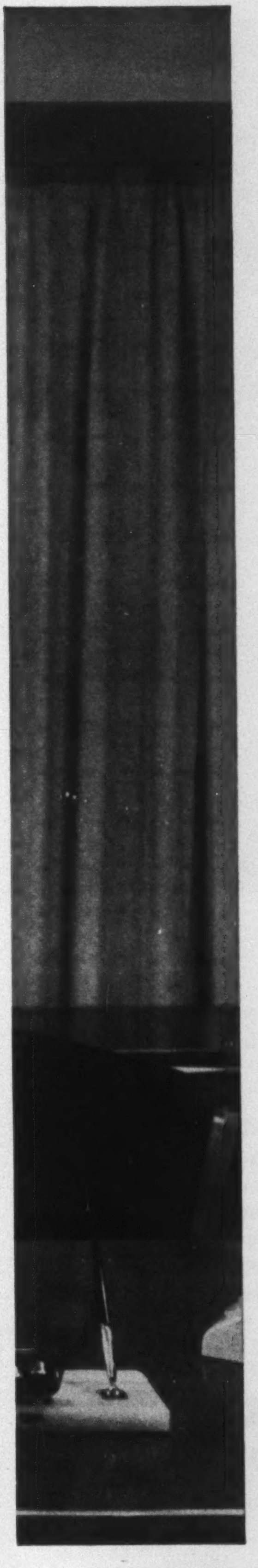


Specialization in bearings enables us to apply to your bearing problems an unmatched engineering talent and experience in powder metallurgy. You benefit, too, from outstanding manufacturing facilities, including the world's largest inventory of dies. Whatever your need, when it's bearings, see the bearing specialists . . . see Bound Brook.

BOUND BROOK

Bound Brook Oil-less Bearing Co., Bound Brook, N. J.
Pioneer in Powder Metallurgy Bearings and Parts.
Plants at Bound Brook, N.J. and Sturgis, Mich.

THE AMPLEXOLOGIST



The Amplexologist occasionally gets more than he bargained for. But that's not bad. It's good. In fact, it's like hitting the jackpot on the 123rd try.

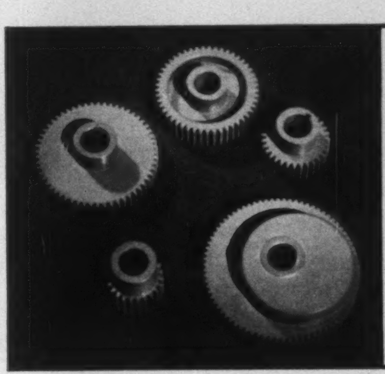
Why? Well, the Amplexologist has convinced any number of manufacturers that a few of the parts in their products can be made better and cheaper by eliminating machining costs through advanced powder metallurgy (i.e. Amplexology).

Strange to say, however, many of these same manufacturers are often hesitant about exploring the broad application of powder metallurgy to their product. Well, it takes time. But sooner or later most of them take the plunge:

> *O.K., Genius. Let's see how good you really are. Take all the prints for our new models. Check every one. Then you tell us how many parts can be made out of powder metal. And how much they'll cost.*

You see? Jackpot. And not just for the Amplexologist. For the manufacturer, too. A cost saving jackpot . . . because he's starting when designs are still flexible to take full advantage of powder metallurgy.

Challenges like this (*"You tell us . . ."*) pay off for manufacturers and for us. They have in fact, helped make us the world's largest and most experienced producer of powder metal parts. Another reason why leading manufacturers say: **When it comes to powder metallurgy —Amplex has the answer.**



"You tell us . . ."

The parts shown are a new gear train: driver gear, high and intermediate speed driven gears, low speed gear, pinion gear. These five parts plus ten more were selected by the Amplexologist—who was called in at the design stage—for powder metal production. All are finished precision parts which require no machining (except the helical gear). Estimated savings on the gear train, 86%.

AMPLEXOLOGIST

SEND COUPON . . . **If you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.**

AMPLEX DIVISION • CHRYSLER CORP. • Dept. I-11
P.O. Box 2718 • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

NAME____________________

COMPANY____________________

ADDRESS____________________

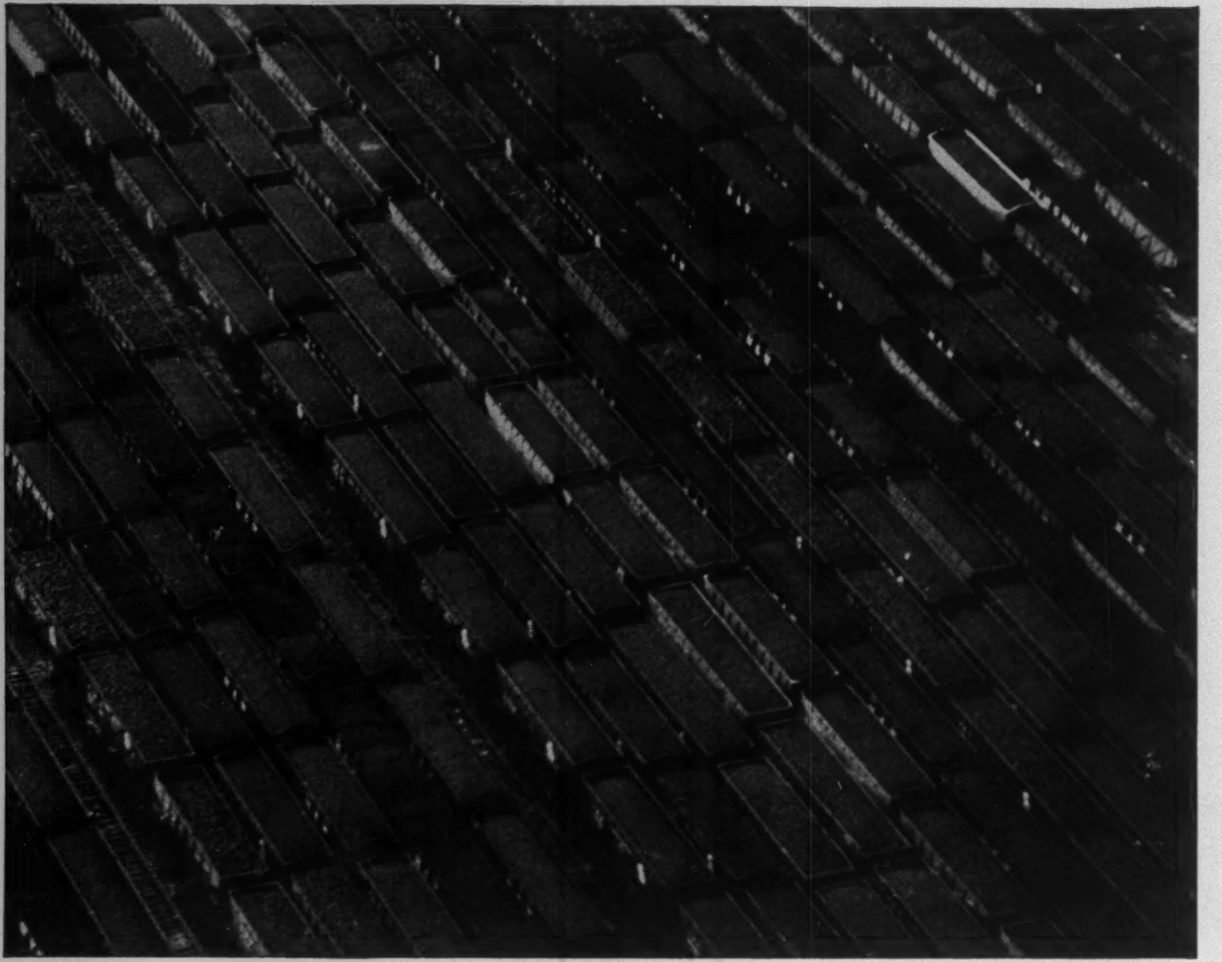
CITY__________ **STATE**__________

PRODUCT____________________

AMPLEX

DIVISION
CHRYSLER
CORP.

A CHRYSLER
OILITE
PRODUCT



How Island Creek helps Great Lakes Steel look to the future

Today more than ever, companies like Great Lakes Steel Corporation are taking a good long look ahead in all areas of their operation. And when they look at coal, they find they must ask some pointed questions of themselves and their suppliers: "Can we count on these suppliers to deliver adequate quantities of the coking coals we're going to need in the years ahead? Can we be sure of the uniform quality of these coals, year in and year out?"

As a major supplier of coking coals to Great Lakes Steel, Island Creek is proud to be able to give such satisfying answers to these questions. For Island Creek's vast reserves of inherently good metallurgical coals assure continuity of supply . . . far into the future . . . of coals low in sulphur, ash, moisture . . . coals of excellent coking characteristics.

We would welcome an opportunity to sit down with you for a good long look at your future. Write, wire or phone.

P.S. TO STEAM COAL BUYERS
An Island Creek Precisioneered Coal may help you lower your cost per 1000 pounds of steam.

ISLAND CREEK

Precisioneered Coking Coals

You can depend on Island Creek . . . a career company dedicated to coal

ISLAND CREEK COAL SALES COMPANY, Chafin Building, Huntington 18, West Virginia • Chicago • Cincinnati • Cleveland • Detroit • Greensboro • New York • Pittsburgh

Is Space Use Legal?

Plans for commercial space-communications systems pose new legislative problems. The next Congress and administration must face them. Sooner or later, the UN may get into the act. Use of space by private companies, say congressional sources, raises a jurisdictional issue. It also poses problems of control and regulation which will involve the FCC and State Dept.

Adopts Brazing Process

Brazing of stainless steel honeycomb for high-speed aircraft and space vehicles will be a new job for the Nortobraze automatic-brazing process. Norair Div., Northrop Corp., was recently awarded an Air Force contract to adapt the process. Nortobraze uses radiant quartz lamps to braze stainless steel in only 2-15 minutes. Northrop also reports much lower tooling costs.

Toothless Saw Cuts Foil

Gaining wide acceptance for missile and aircraft jobs is a new electro-band saw. It machines honeycomb, metal-foil structures, and thin-wall tubing. The saw has no teeth. Instead, it cuts by a sustained arc, quenched by a flood of water. It's energized by a low-voltage high-current power supply. Cutting rates are 5-200 sq in. per minute.

Transistor Resists Heat

Transistors, made from silicon carbide, are expected to offer a boon to planned aircraft and space vehicles. These micro-sized semiconductor devices perform well even at temperatures above 650°F. Scientists at Westinghouse foresee their upper operating range to be over 925°F. The transistor is a unipolar device which acts like a valve. It opens or closes to regulate electron flow across a junction.

Invades Air Force Space

The Navy is thinking of invading the Air Force's space bailiwick. Under present Pentagon policy, the Air Force has sole responsibility for launching military space vehicles. But the Navy is now talking up ship-launched satellites. Vice Adm. W. R. Raborn reveals that the Navy plans to build an "astronautic ship" to launch, track, and recover space vehicles. However, the Navy has no money for such a ship. Before it gets any, another intra-service squabble is likely.

Machines By Ultrasonics

Look for more ultrasonic machining in the aerospace field. Research labs are studying effects of high-frequency vibrations on grinding high-strength thermal-resistant alloys. Meanwhile, ultrasonic machining is being applied to glass, ceramic and other missile parts which defy most shaping techniques.

Mirrors Aid Research

A new furnace enables aeronautical researchers to study engineering materials at high temperatures. Furnace consists of two 60-in. diam paraboloidal-searchlight mirrors and a modified electrode mechanism. These provide a heating-rate range from 100-1000 Btu/ft^2-sec. Present studies include graphite-base and silicon-carbide-base materials.

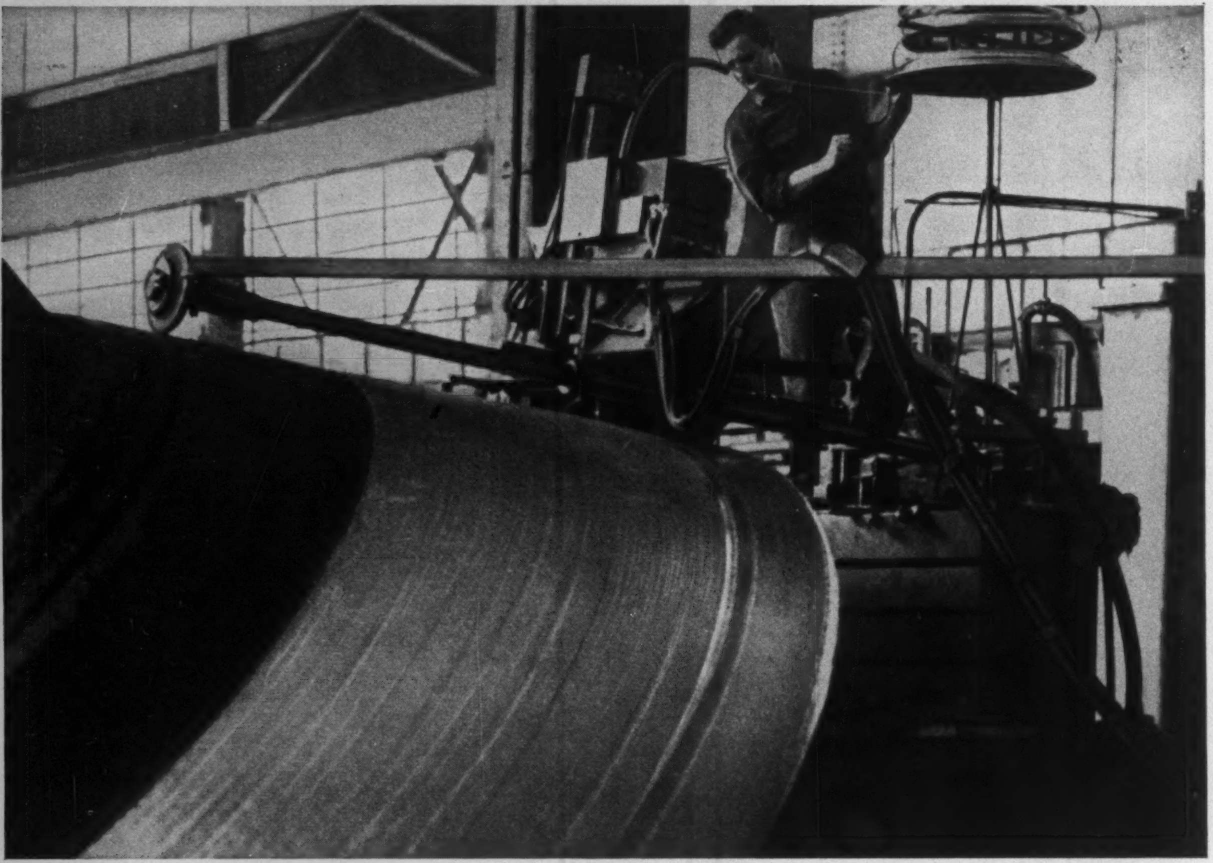
Upgrades Welding Methods

Many methods of joining materials are being upgraded to meet aerospace demands for greater weld-joint strengths. Emphasis will be put on fusion rather than resistance methods. Among other needs pointed up by a recent survey are techniques for welding refractory metals to dissimilar metals, and for metals to glass.

Fast Stops at 175 Mph

Key to the fast stopping action of Lockheed's new jet-powered transport are sintered-iron brake linings. First, these linings convert up to 34 million ft-lb of kinetic energy into heat energy. Then they dissipate the 2000°F destructive temperatures. Braking occurs by friction caused by clamping together rotating and non-rotating disks.

METALS LIVE LONGER . . . WHEN HARD-FACED WITH "HAYNES" ALLOYS



Submerged-arc welding equipment here deposits HAYNES hard-facing alloys on large areas of a 15-foot diameter blast furnace bell, to resist abrasion, impact, erosion.

Hard-Facing BIG Areas . . . Rapidly

Many big jobs are now being hard-faced with standard submerged metallic-arc equipment—using HAYNES alloys. The advantages: high rate of deposition, up to 20 pounds per hour; large cross sections faced without pre-heating; minimum deposit dilution by use of multiple layers.

For hard-facing gyratory crushers, blast furnace bells and hoppers, crusher rolls and jaws, tractor rollers—wherever impact, abrasion, heat, corrosion, erosion are problems—HAYNES alloys in drawn-tube rod form give the desired properties. They feed smoothly and uniformly.

Many smaller-area hard-facing jobs, too, are being done faster and at lower cost, on a production-line basis. Whether you hard-face large areas or small—whatever your hard-facing job is—it will pay you to insist on HAYNES rods. Our field engineers will gladly help you solve your hard-facing problems. Write us today!

HAYNES
ALLOYS
HAYNES STELLITE COMPANY
Division of Union Carbide Corporation
Kokomo, Indiana

UNION CARBIDE

Address inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, N. Y.

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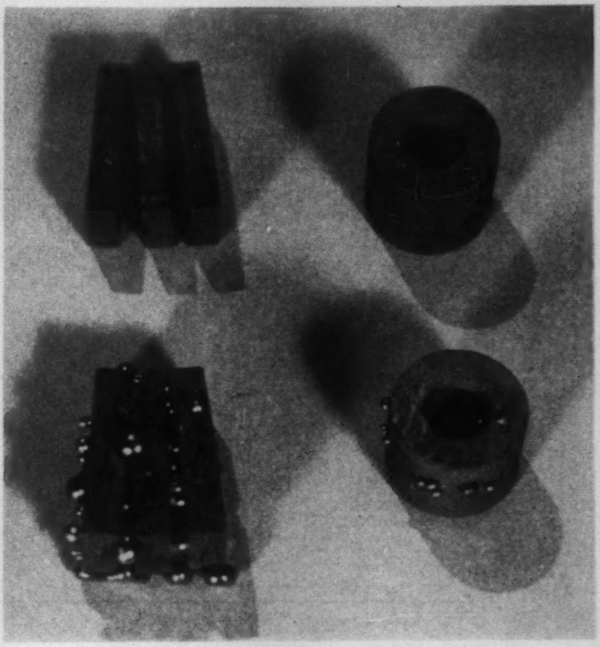
FAST RATES: Metal-graphite parts are made at high speeds by the exclusive licensee, Dixon-Sintaloy, Inc.



SOME COMPACTS "SWEAT": New metal-bonded bearing materials (top) do not "sweat" during sintering.

New Family of Metal Graphites Handles Many Bearing Jobs

By **M. Humenik, Jr., D. W. Hall,** and **R. L. Van Alsten**—Applied Science Dept., Ford Motor Co., Dearborn, Mich.

Anti-friction properties and strength are combined in a new family of metal-bonded graphites.

Key to the development is a technique which prevents "sweating" of powder compacts during sintering.

- Graphite serves in a wide range of anti-friction, electrical, and refractory applications. But as an engineering material, graphite suffers from two serious shortcomings—brittleness and low strength.

Recently developed, though, are metal-bonded graphite materials that appear to be answers to these problems. These materials combine the strength of metals with the anti-friction properties of graphite.

Applications Vary — Potential uses for these materials range from bearings and pressure seals to certain electrical and high temperature applications.

Getting most attention at this time, however, is the field of bearings. The broad range of compositions available — from 90-40 pct graphite—allows these materials to be used for both dry and externally lubricated bearings.

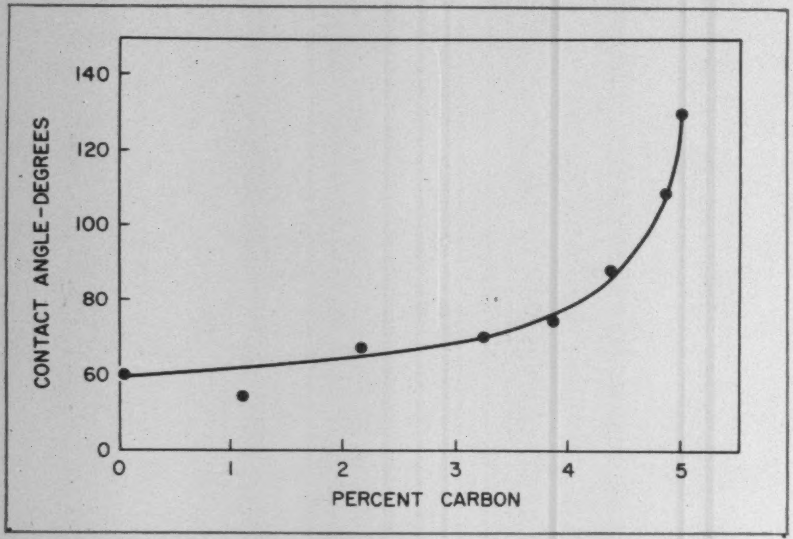
Depends on New Process—Vital to the development of these improved bearing materials is a new process. Mainly, it consists of standard powder-metallurgy techniques and liquid phase sintering.

Liquid-phase sintering is a well-known technique. Among other advantages, it offers high sintering rates. Yet, heretofore, this technique has not been possible. Why? Liquid metals have poor compatibility with graphite.

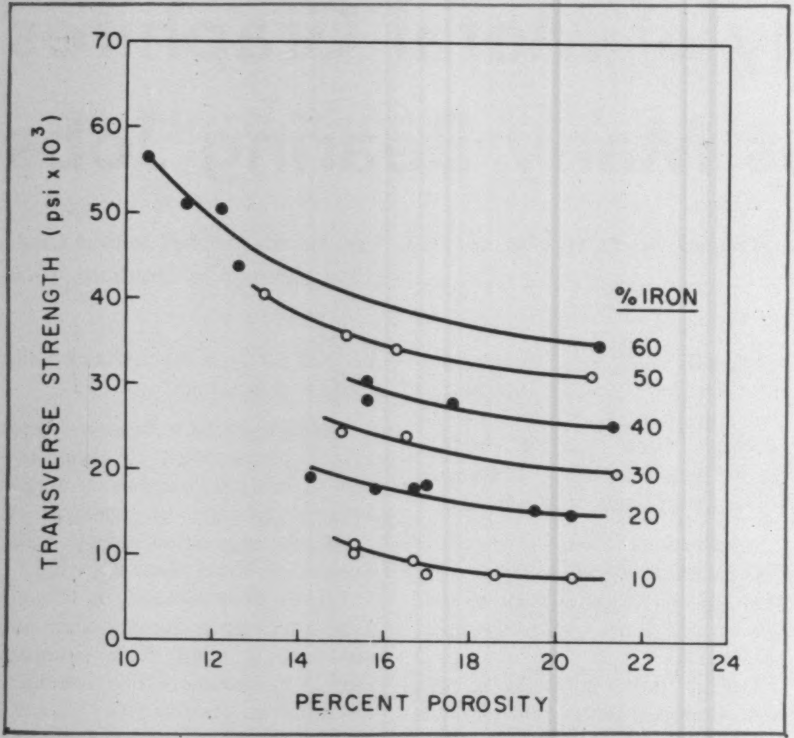
What happens is that, in metal-graphite systems, liquid metal "sweats" from the compact during sintering.

Angle Is Factor—Sweating is due to the poor wettability of the solid by the liquid. In turn, wettability is defined by the contact angle between solid and liquid. Calculations show that if the contact angle is greater than 90°, the liquid metal will be free to sweat.

Thus, it should be possible from wettability studies to predict the sintering behavior of liquid-solid systems.



CARBON AFFECTS WETTING: An abrupt change from wetting to non-wetting takes place at the eutectic composition (about 4.3 pct carbon).



STRENGTHS ARE HIGH: Strengths of iron-rich compositions and graphite-rich compositions compare favorably with standard bearing materials.

The table gives results of studies on various metal-graphite systems. Note that contact angles for copper, silver, and aluminum are greater than 90°.

Unexpected Results—Since these metals do not wet graphite, it's expected that they would sweat from a compact during liquid-phase sintering. As for iron, nickel, and cobalt, it's expected that they would be retained. However, in practice, all these metals sweated.

This strange sintering behavior called for a more detailed study of wetting in the iron-graphite system. Of special interest is the effect on graphite wettability by adding carbon to iron.

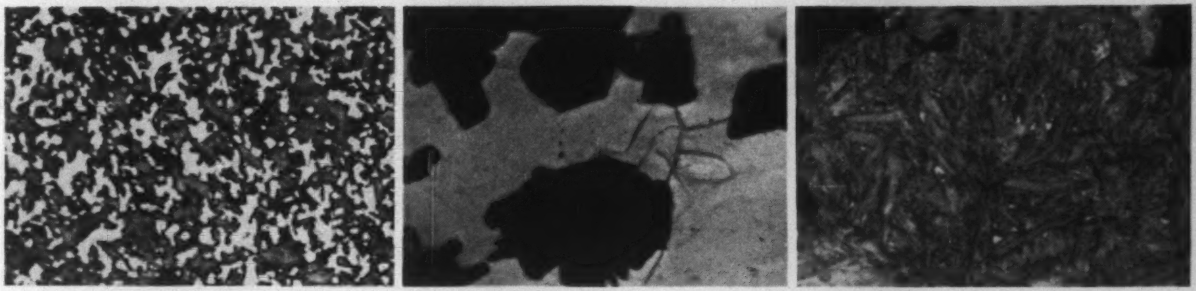
A series of alloys having various amounts of carbon were prepared. Alloy specimens were placed on graphite substrates. They were then rapidly heated to the liquid's temperature.

Varies With Carbon—Results of this study show that the wetting action of iron on graphite varies with the carbon content of the iron. Note, on the first graph, that an abrupt change from wetting to non-wetting takes place at about the eutectic composition (4.3 weight pct carbon).

This non-wetting of graphite by carbon-saturated iron accounts for sweating during liquid-phase sintering. Non-wetting contact angles of 145° and 130° were also measured for carbon-saturated nickel and cobalt alloys on graphite. These data also account for the sweating of these metals during sintering.

Thus, it appears that the wettability of graphite must be improved to be able to sinter metal-graphite compacts containing iron, nickel, cobalt, copper, silver and aluminum.

Enhances Wetting — It's also known that wetting can be enhanced by decreasing the solid-liquid interface energy. And, one way to decrease the interface energy is to alloy with surface-active additions.



POINTS UP STRUCTURES: Microstructure (left) is of typical 30 Iron-70 Graphite composition at 100X magnification. Ferritic (center) and martensitic (right) structures of metal phase are at 2000X magnifications.

Previous work on graphite spheroidization in iron-carbon alloys showed that small amounts of inoculating agents lower the liquid alloy-graphite interface energy.

These results suggest that adding certain nodulizing agents to iron-graphite compacts might promote the desired wetting.

Takes Little Calcium — Subsequent sintering studies proved this hypothesis to be valid. It was found that best results were obtained with calcium added as a powdered 35 pct calcium-silicon alloy. An alloy addition as low as 0.1 weight pct of the metal phase inhibits sweating of the liquid phase during sintering.

Calcium was added in the form of a calcium-silicon alloy. Hence, a study was made of the effect on graphite wettability by adding silicon to iron. The data indicate that the improved wetting of graphite is due only to calcium.

Composition ranged from 90 to 40 volume pct graphite. Processing involved mixing of the powder constituents, cold pressing, and sintering. Temperatures were above 2100°F in an inert gas, hydrogen atmosphere, or vacuum.

Treatment Is Standard—In the furnace-cooled condition, the structure of the iron phase is ferritic. However, both pearlitic or martensitic structures can be obtained. All that's required is standard heat treatment of the sintered specimens.

During sintering, almost no shrinkage occurs in the graphite-rich compositions. This holds regardless of sintering temperature or time. Consequently, sintered density can be closely controlled by controlling green density.

What is the strength of these iron-bonded graphites? The second graph contains data for various compositions containing 5 pct of the calcium-silicon alloy.

For the graphite-rich compositions, strengths are comparable to pure graphite materials. For metal-rich compositions, strengths are comparable to porous-metal materials used for bearing jobs.

Obtain New Data — More data on the properties of iron-graphite compositions are being obtained. Studies are also in progress on evaluating properties of other metal-graphite systems. Included are those containing nickel, cobalt, copper, silver and aluminum.

Metal-bonded graphites have advantages other than strength and wear resistance. Parts can be made by high-speed powder-metallurgy techniques. And the materials permit sizing operations to give close tolerances.

Data are also being obtained on the performance of oil-impregnated iron graphites at various loads and speeds. The reason: to establish the PV factor for these materials.

Describes Performance—The PV factor is the product of load and velocity. It's used to describe the range of satisfactory performance of bearing materials.

For some porous metals, the PV value is reported to be about 50,000. Preliminary results on iron-graphite indicate that PV values nearing 200,000 may be obtained.

Angles Hint at Wettability

Metal	Temperature, °C	Contact Angle*, Degrees
Iron	1425	60
Nickel	1425	60
Cobalt	1425	82
Copper	1150	170
Silver	1000	167
Aluminum	875	153

*Of liquid metals in graphite

Suppressors Tame Explosions When Plant Safeguards Fail

Explosions cause more than $100 billion in losses every year in the United States.

Most current efforts to reduce these losses are passive. A new system takes the offensive by quelling all blasts.

▪ A new system suppresses incipient explosions. It acts within a few thousandths of a second to literally snuff out a blast before destruction can occur. Thus, this new blast suppressor offers active — rather than passive — protection against wide-spread explosions.

Potential explosions pose a threat to nearly every process industry. These hazards are also present in the metalworking industry. Certain metallic dusts create explosive problems.

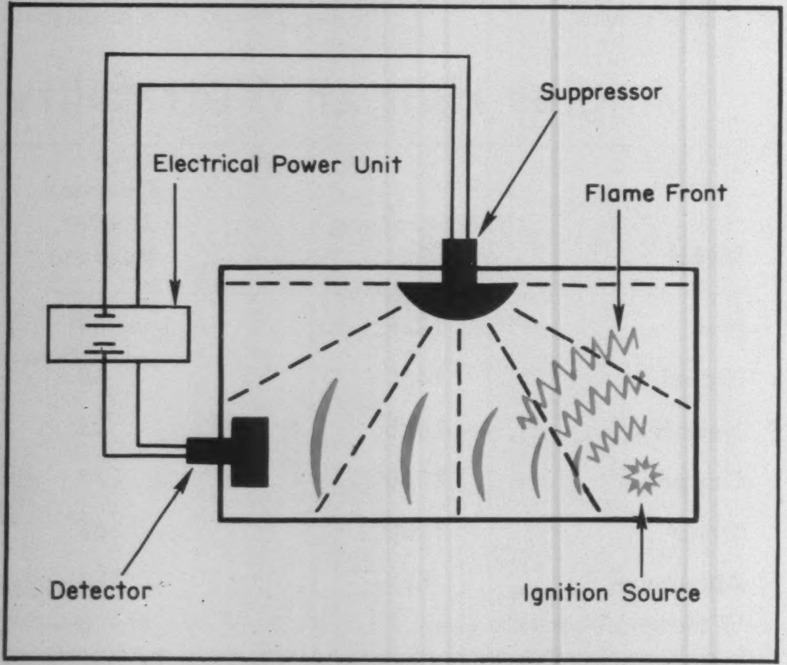
For example, when cutting magnesium, a machinist must always use sharp tools. Magnesium shavings must be kept in closed containers. The table lists a few other industrial-explosion hazards.

However, even with the best safeguards, explosions still lurk just around the corner. Relax your guard for one minute . . . and boom!!!

Fills Gap—A new protection system takes over where purely precautionary measures leave off. It detects an explosion at the instant of its inception. Then it suppresses the blast before damage occurs.

This explosion-protection system is a product of Fenwal Inc., Ashland, Mass. It's based on a British World War II development that prevents explosions in aircraft fuel tanks—even when the tanks are hit with incendiary shells.

How System Suppresses Blasts



The system has been applied to several installations in the United States. It has proven, either in service or in tests, capable of handling most industrial-explosion hazards.

Here's how the system works. Although a blast appears instantaneous to the eye, there's a finite time lapse between its ignition and the buildup of destructive pressures. The protection system acts within this period.

Combined Actions — In a few milliseconds the system senses the start of an explosion. It detects the initial pressure buildup or the first tiny flash of flame. Then it renders the blast harmless by a combination of actions.

These actions are five-fold. They include suppression, venting, advance inerting, isolation and automatic plant or equipment shutdowns.

Suppression consists of the envelopment of the explosion with a suppressant. Venting is the opening of a path to the atmosphere for pressure relief.

Advance inerting is a little more complex. It centers on the introduction of a suppressant into areas that are located away from the explosion's source. This prevents secondary blasts or fires.

By isolating the blast, the system blocks the explosion from spreading. Automatic shutdowns also protect equipment in other sections of the plant.

System Components—Each system is tailored to meet the needs of the process or equipment that it protects. But all installations consist of standard parts. These parts include: a pressure-sensitive blast detector; a power unit with stand-by batteries; a high-speed isolation valve; a hemispherical suppressor; an explosively-actuated vent; radiation detectors and high-rate discharge bottles.

The heart of the system is the blast detector. This detector senses an explosion and, in conjunction with the power unit, generates an electrical signal. All pressure detectors are sensitive to a rate-of-pressure rise and/or to a specific static pressure.

A signal occurs when the pressure rise from an incipient blast exceeds either setting. This signal shows an explosive condition. Radiation detectors preclude false alarms. They sense the wave lengths of the spectrum which exist in an explosion's flame. They reject all other wave lengths. This prevents natural or artificial light from triggering the alarm.

No Human Factor — Upon receipt of a signal, the power unit takes over. It delivers electrical energy which activates the various protection devices in the system. As a safeguard against power failures, the power unit has its own stand-by batteries.

There are two types of suppressors. They may be in the form of easily-ruptured containers. Or they may be high-rate discharge bottles. All contain liquid suppressants.

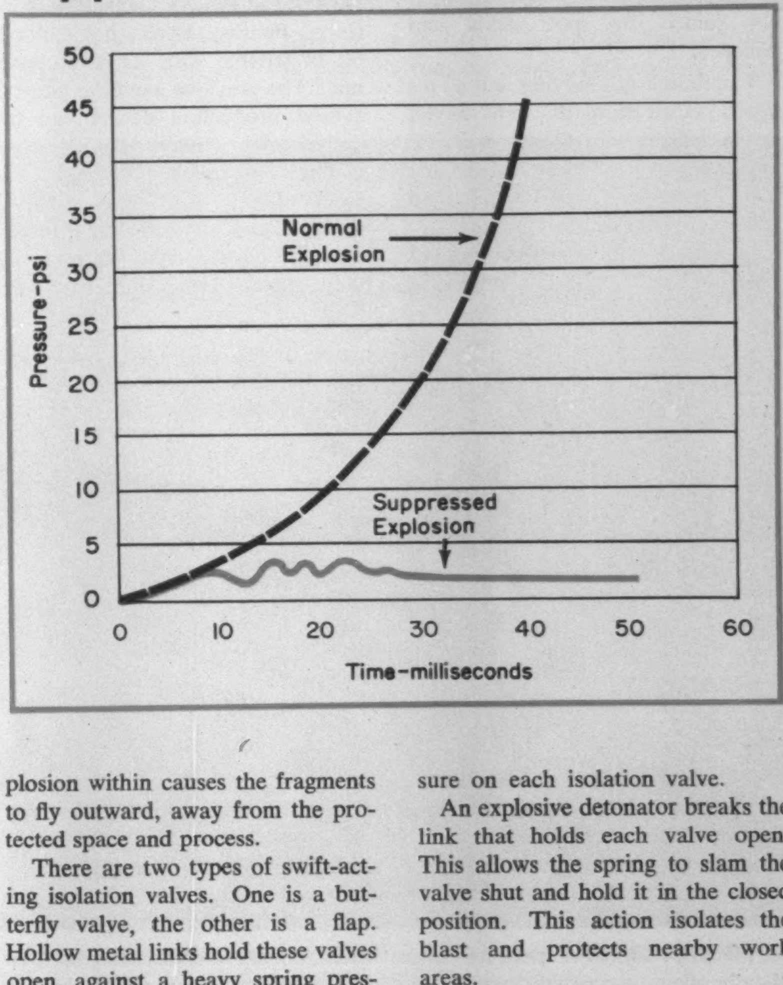
When activated, they dispense the liquid in fine particles. This liquid moves at speeds up to 600 fps.

Evaporation of the suppressant's mist cools the incipient blast and prevents further combustion. The most common suppressants are water and bromochloromethane. Only 5-cc of water or 2-cc of bromochloromethane suppress a blast of 1-gal volume.

Blast Hazards Pose Problems

INDUSTRY	HAZARDS
Metalworking	Large scale painting and dipping; ovens and furnaces; paint drying; new metals such as sodium, titanium, zirconium; uranium, etc.; dusts of combustible metals; large boiler installations (common to many industries).
Chemical Processing	Complex hydrocarbons; plastics; insecticides; exotic fuels; ozonides; hydrogen peroxide; organic peroxides; and many others.
Aircraft and Missiles	Exotic fuels; fuel test-cell facilities.
Paint and Varnish	Synthetic resins and varnishes.
Power Generation	Pulverized coal; boilers themselves.

Suppression Reduces Damage



Isolates Blast—All vents consist of special glass windows. An explosive detonator is mounted against the outer panes. When the detonator is activated, it breaks the glass. The pressure of the incipient explosion within causes the fragments to fly outward, away from the protected space and process.

There are two types of swift-acting isolation valves. One is a butterfly valve, the other is a flap. Hollow metal links hold these valves open, against a heavy spring pressure on each isolation valve.

An explosive detonator breaks the link that holds each valve open. This allows the spring to slam the valve shut and hold it in the closed position. This action isolates the blast and protects nearby work areas.

Moving Chains Replace Shuttles In Automated Forming Line

By **Herbert Chase**—Consultant, Forest Hills, N. Y.

In constant motion, silent- and roller-type chains remove major bottlenecks from an automaker's hood-fabrication line.

As a result, hood production costs have tumbled 25 pct.

▪ Cars now employ hoods that differ in design from those of earlier vintage. However, general hood construction remains similar. It centers on inner and outer panels, joined by spot welds and clinches.

Continuously-moving chains speed fabrication of 1961-model automobile hoods. Shuttle units on an automaker's main press line have given way to silent- and roller-type chains.

A high degree of automation still remains; but radical changes in transfer have been made. These changes effect a total reduction of about 25 pct in hood-production costs.

Presses for forming, trimming, flanging and piercing outer panels haven't been altered. They're the same equipment used to form last year's model.

Transfer Changes—In automation, on the other hand, drastic changes have been made. Last year, the Pontiac Div. of General Motors Corp., Pontiac, Mich., had quite a bit of trouble with its main press line. The previous handling method caused production delays and required a lot of maintenance.

This old transfer method consisted of long shafts that extended through, and between, four presses. Transfer shuttles reciprocated along these shafts. These shuttles carried arms that were rocked to lift or to lower panels as needed.

Transfer cylinders and their controls were a major source of trouble. Limit switches and other electrical equipment also caused more than their share of downtime.

These factors led to a revised design of transfer components. Now, there's less reliance upon electrical equipment, except for motors and their controls.

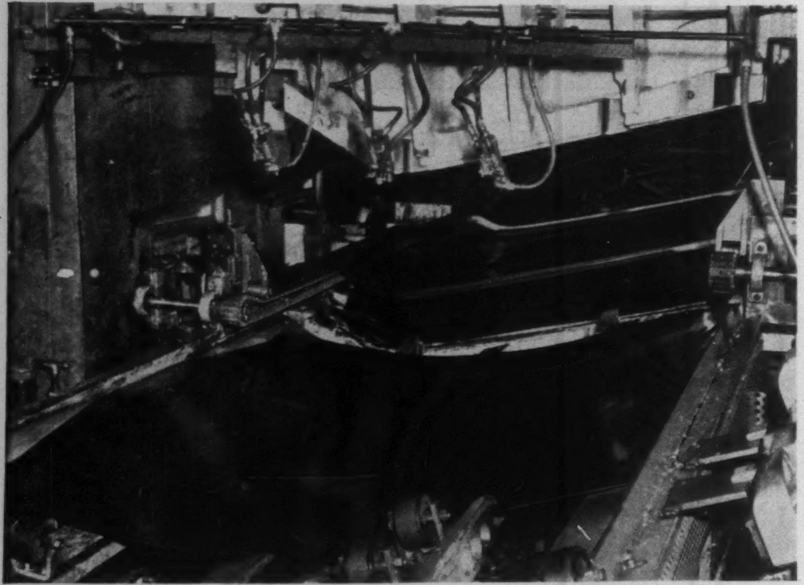
Continuous Motion—Shuttles and shafts have been scrapped. In their place, silent- and roller-type chains move the outer-hood panels through the line. All chains run continuously and operate in pairs. Chain speeds are adjustable.

Each pair of chains, along with sprockets, shafts and supporting bearings, moves in both longitudinal and transverse directions. The chains move inward to lift the panels; then they advance the work along the line. They move apart to allow clearance during forming operations.

A single air-operated plunger brings the chains together on one stroke. Positive linkage on this plunger separates the chains on the reverse stroke. The same plunger controls die knockouts. It elevates arms inside the dies to lift the outer panels into position.

Safety Stops—In general, all panels rest on the chains when they're being advanced. But when there's a snag in the line, a safety stop lifts the panels above the chains. Thus, the chains slip under the panels until the stop pin is lowered. This prevents die damage.

The new arrangement gives far less trouble than the shuttle



INTO THE LINE: A hand-fed loader inserts blanks into the draw die. As the die opens, chains advance the drawn panel into a turnover unit.

method. Between presses, there are other pairs of chains. These chains deliver the panels from press to press.

Each press also has its own pair of feed chains. These chains extend beyond the press to overlap the intermediate delivery lines.

Quick Turnover—Steel blanks, cut from coil stock, are stacked and fed manually into an automatic loader. The loader positions each blank in the draw die. As the die opens, knockouts elevate the drawn panel. At the same time, chains move in to advance the panel to a turnover unit.

Next, the panel advances into a trim die. When the trim die closes, all scrap drops onto belts. These belts carry the waste away. After trimming is completed, the die opens. Again, the chains move in to advance the panel to a flanging die.

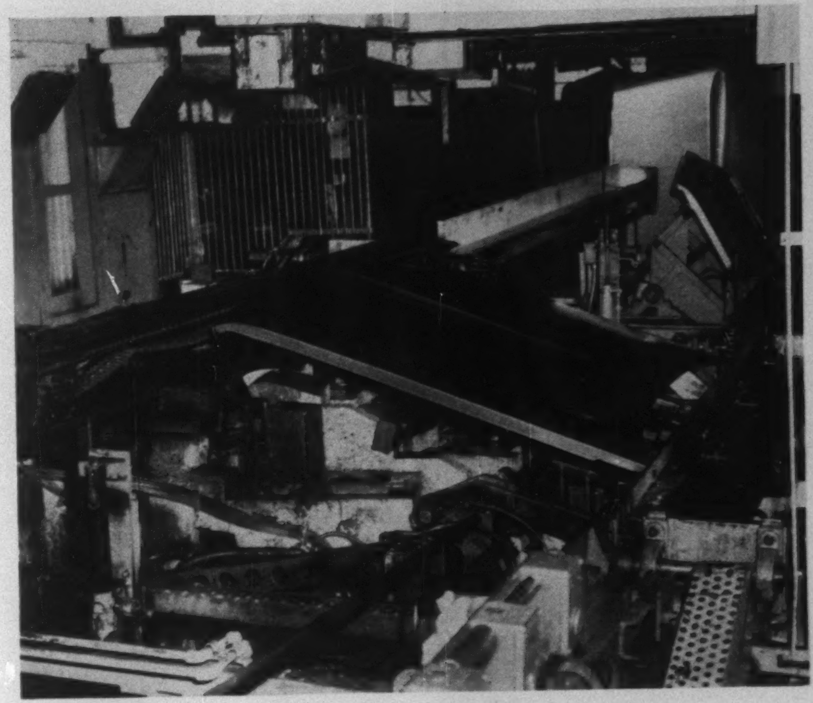
Actually, there are two flanging dies in the line. The second flanging die, in the fourth press, also pierces some holes in the outer panels. At all press stages, the chains move apart for die-and-part clearance.

Production of the inner panels takes place on another line. Chains aren't used on this line. However, some angle rails are employed to speed the panels' advance among three presses.

Displace Panels—An extractor unloads the draw press and discharges the inner panels onto the rails. As each panel drops onto the rails, it pushes preceding panels along the line.

At the end of the inner-panel line, the panels are stacked on pallets. Then they're transferred to spot welders that join outer and inner panels. Some crimping occurs in the welding process.

Final hood assembly takes place in a tip-up pneumatic unit that's automatically loaded. Pneumatic plungers actuate tools that crimp or rebend the whole width of each hood's nose flange. End result is car hoods that fit better than ever.



SECOND FLANGING: Chains move the panel through the line into four separate press stations. The last two stations handle flanging operations.

HOOD ASSEMBLY: After each inner panel is spot welded to its mate, the assembly enters a tip-up machine which crimps the hood's nose flanges.

Metals Plus Plastics Delay Fatigue and Corrosion

The familiar whirlybird banks on lightweight strength for ease of maneuverability.

Its blades rely on many metals, plastics and adhesives for design superiority.

▪ The many parts that go into the manufacture of a helicopter blade have to pass the endurance test. Endurance, in this case, is over 6000 hours of actual service. To make the grade, the metals, plastics and bonding adhesives that go into the product must combine to forestall the adverse conditions of corrosion and fatigue.

At Plant No. 7, engineers of Boeing Airplane Co.'s Vertol Div., Ardmore, Pa., are ever alert to improvements in safety for helicopter flight. Despite the flood of interest given to more exotic materials, 4340 steel continues to be the backbone of the vital blade.

At Vertol, 4340 steel is the metal used in the main "D" spar on the company's new Boeing-Vertol 107 whirlybird. But, before the 25-ft long blade gets its final coat of paint, sections of stainless, aluminum and plastics are also joined together to create the improved design.

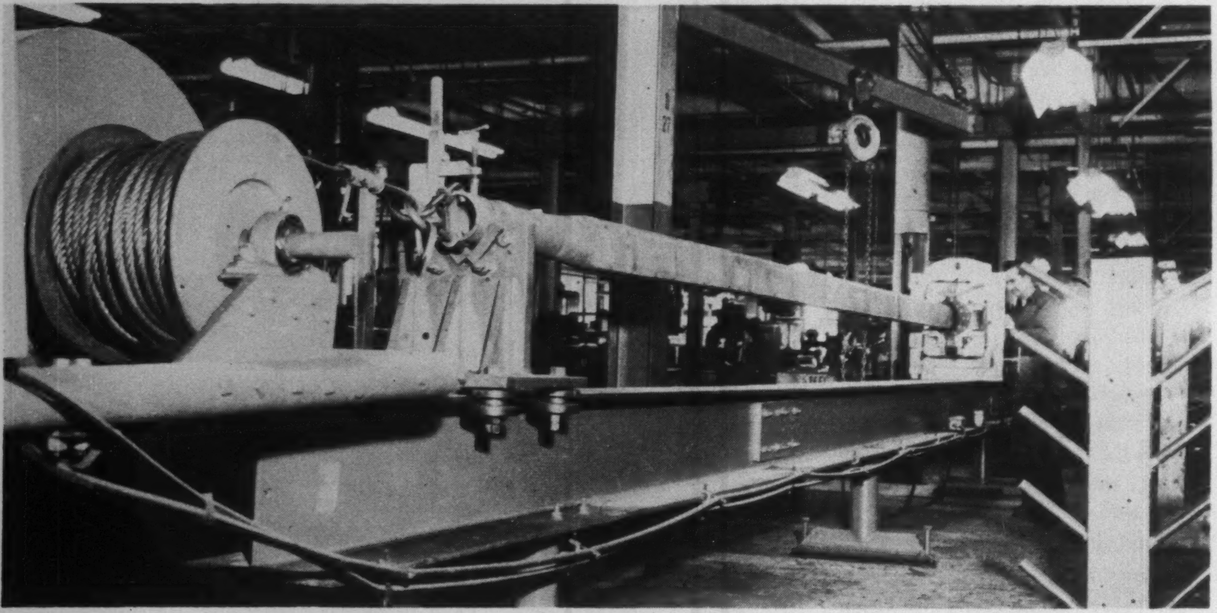
Starting Point—Tapered sections of 4340 seamless tubes, accurately rounded, come into the receiving dock from Tube Reducing Corp., Passaic, N. J. To get these tubes into the desired shapes, Vertol follows a set pattern of processing.

First, the end which later becomes the root end is contour turned. Then the entire tube section is degreased. Next comes sizing or the roll forming of the "D" section. Each tube then moves into the controlled - atmosphere furnace for stress relieving.

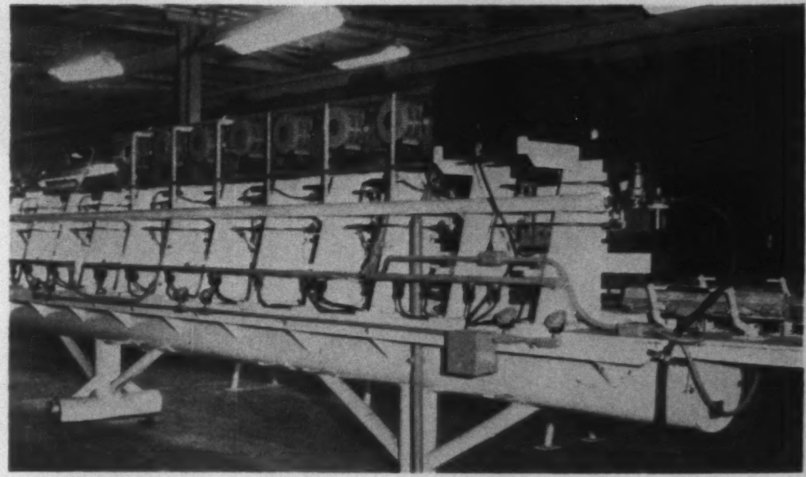
After the first stress relief, the tubes obtain three rolling passes to contour them to the final "D" shape. Another stress - relieving treatment is given between the second and third passes. As soon as the tip is cut off to spar length, the tubes are hardened and quenched in salt baths.

Twisted Tubes — Snap tempering comes next, followed by grit blasting of the inside tubing. Back in the controlled-atmosphere furnace again, each tube gets a 7° twist. This is a progressive twist that extends the whole length of the section.

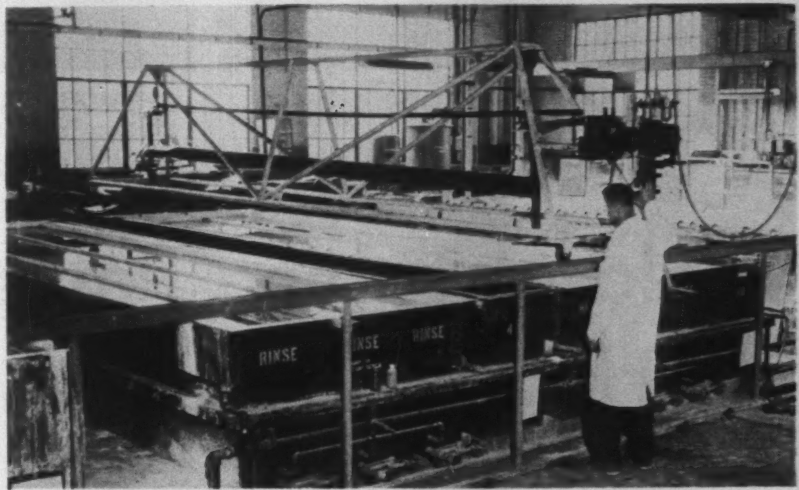
Inspection requires that a second grit-blasting step be used. Once completed, the root end is finish turned, threaded and counterbored. Final length is adjusted by sawing. Drilling and reaming make ready



ROLL FORMING: After the root end of each spar section has been contour turned, it is sized or roll formed into a practical "D" shape. The next step is stress relieving in a controlled-atmosphere furnace.



BONDING STEP: Fairings or boxes are joined to the 4340 spar in the main bonding fixture using strip heating and hydraulic pressure.



COATING OF ZINC: Each spar passes through zinc plating sequence. Thickness of the zinc coating is held between 0.0007 and 0.0012 in.

the lock pin hole, necessary for ultimate assembly.

The outside surface receives a grit blast. Then the section is ready for zinc plating. Thickness of the zinc coating is held between 0.0007 to 0.0012 in. on the tube surface. After the tube is chromate coated, it's finally ready for bonding. It's also ready for corrosive environments.

Smooth Finish—A liquid bonding adhesive is applied to the entire surface. Sections are then air dried and pre-cured. Then a second coat goes on to restore a good, smooth surface finish.

While processing goes on with the 4340 steel section for the leading edge, work starts up in other parts of the plant on the trailing edge and the boxes or fairings.

The trailing edge consists of a strip of laminated Type 301 stainless, bonded together with Narmco 4021 adhesive. The fairings are now made up from aluminum ribs and plastic skins. The plastic, although slightly heavier than the metal formerly used, prevents corrosion.

Proper Balance — The balance blade consists of two metal sections. One is a channel of Type 301 stainless. The other is a trapezoidal structure which acts as the weight. The latter is fashioned from 4340 steel, too.

All 4340 parts are grit blasted before bonding, while the stainless, plastic and aluminum components are all chemically cleaned.

After the trapezoid and the channel are bonded together, they move into the main bonding fixture. Fairings, on the other hand, are bonded to spars by pressure while positioned inside electric heating blankets. The channel and weight assembly is bonded inside the spar under pressure from a mechanical mandrel.

Heat for the entire assembly is supplied on the outer surface of the spar in the main bonding system.

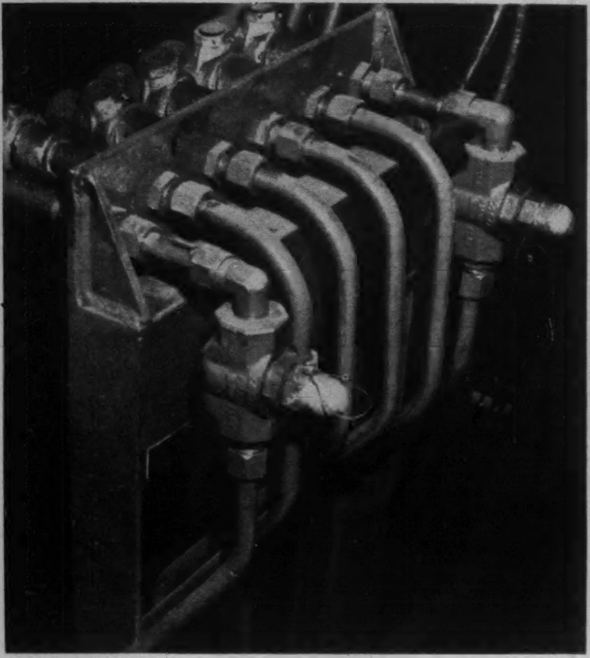
Fairing Output — The plastic skins for the fairings are produced in three sizes. The 14-in. skins for the tip end and the 12-in. long boxes in the center of the blade span are cut from large sections, shipped in from Minnesota, Mining & Mfg. Co., Detroit.

The thicker plastic sections for the root end are produced on a custom-designed 50-ton Elmes press. The fairings are separated by a rubber seal.

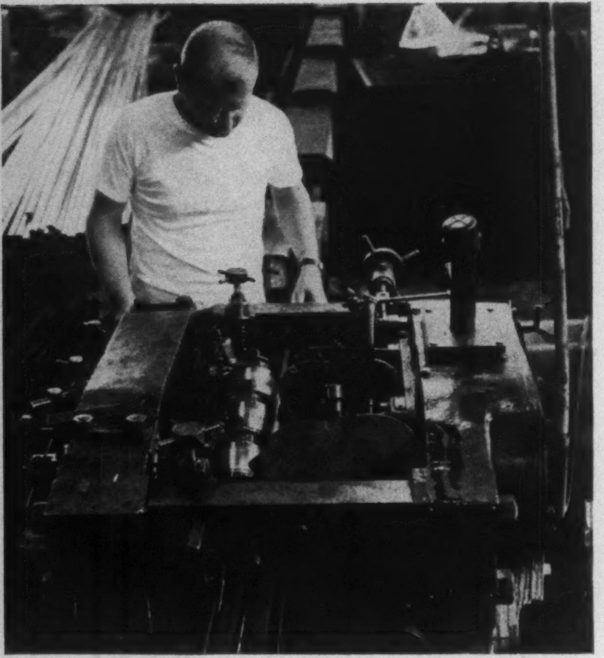
At the end of the line, balance weights and anchor fittings are assembled onto the leading edge. The entire blade is then surface finished. Anchor nuts and screws fasten the stainless tip cover, while the root-on socket is screwed onto the threaded spar end. Each blade is balanced and tracked to make it interchangeable with any 107 aircraft.

Blade inspection is actually built right into the processing system. However, the most critical evaluation concerns camber. It cannot be off more than ±0.015 in. It all adds up to at least 6000 hours of airborne efficiency.

These blades will propel the flight of the new Boeing-Vertol 107. It's the first twin-turbine helicopter to win the Federal Aviation Agency's stamp of approval for commercial use.



FLEXIBILITY: Welded tubing proves to be flexible in the hydraulic system of a special machine.



STRAIGHTENING STEP: Once the tubing has been annealed, bends are removed with a rotary straightener.

Welded Tubing Passes Test For Hydraulic Line Uses

Overly-conservative buyers prefer seamless tubing in their hydraulic systems.

Why not look into welded tubing? It's just as strong and far less costly.

▪ Users of hydraulic line tubing can either specify welded or seamless. The former is fairly new. As a result, industry isn't convinced that welded tubing is the better value.

Let's look at the facts, though. Welded tubing, for example, will withstand as much, if not more, pressure than its seamless competitor. It also costs much less. Based on dollars alone, industry has no choice but to study ultrasonically-tested welded tubing seriously.

Anticipating the growing demand for welded hydraulic line tubing, The Babcock & Wilcox Co. has invested $500,000 to expand its Keystone Plant in Alliance, O. This move is designed to increase output of cold-drawn welded tubing by 300 pct.

By the Book—Every inch of tubing produced in the new facility is governed by the strict manufacturing standards of the Joint Industry Conference, as adopted in April 1959. J.I.C. standards also protect the customer in another way: They govern the end use of the product.

A new S.A.E. standard adds even greater impetus to the newcomer. Today, it's widely used in such industries as machine tool, farm and earth-moving equipment, hydraulic lift truck and automotive. These industries have nothing to lose. They can lower production costs without decreasing product quality.

The resistance-welded tubing made by B. & W. is backed by more than 20 years of manufacturing research. This same line of tubing has also been subjected to six years of field testing. The tubes are manufactured in essentially the same way as high-pressure boiler and heat-exchanger tubes that B. & W. supplies to the power and process industries.

Steel Types—The Keystone Plant works with single-width rimmed strip or aluminum-killed steel. The strip arrives with enough edge rim to allow trimming without exposing the core metals. Strip for the new tube is trimmed just before welding.

Weld flash, or bead, on both the inside and outside of the tube is removed automatically during fabrication. Any difference in grain structure between the weld and tube body is also eliminated. A continuous normalizing heat treatment resolves the two structures into a homogenized grain structure.

It's vital that the buyer get tubing with a preset degree of hardness and tensile strength. At the same time, however, the material should be soft enough to meet bending and flaring requirements. These traits are insured through proper annealing.

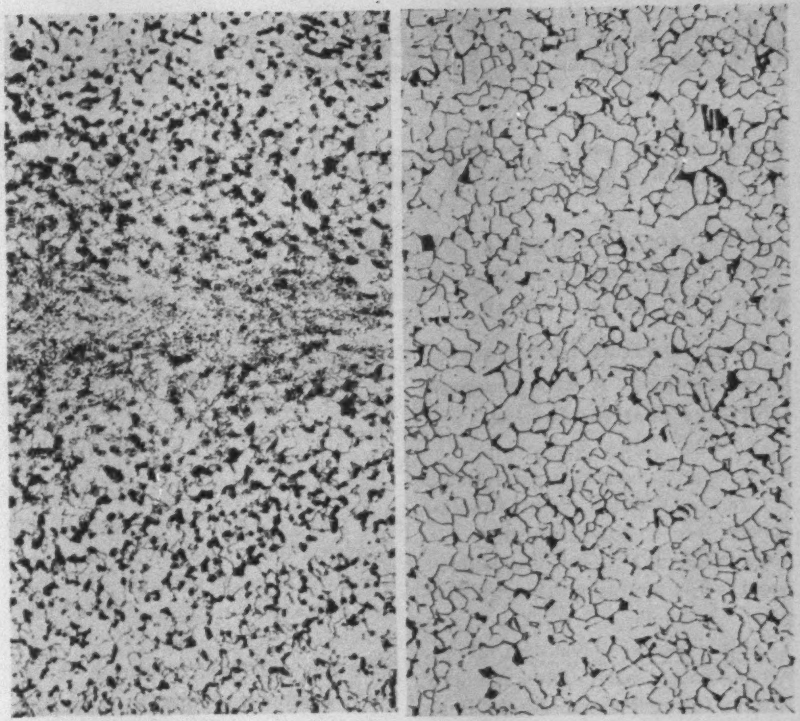
Sample Checks—As strip arrives at the plant, samples are taken which are checked for hardness, thickness and width. The scale is pickled off and further samples are milled for chemical analysis.

Pattern structures are determined once the sections have been macroetched. Here's where any defects in the strip are spotted. When defects are noted, it's cause for strip rejection.

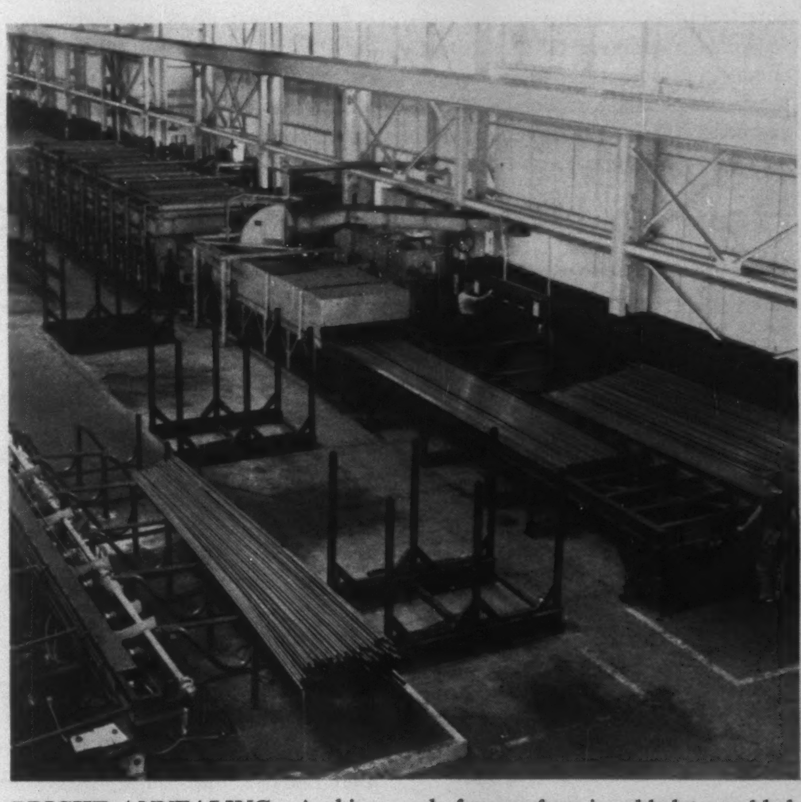
Strip ends are squared and are then butt welded to one another to form one continuous coil. From a loop arrangement, strip enters the rotary slitter where it is edge trimmed to an exact width. The strip then moves into the forming mill. Here, it's shaped cylindrically. Beryllium-copper roll-type electrodes perform the welds.

Normalizing—The controlled-atmosphere furnace brings the tubing up to a normalizing temperature of 1700°F. The furnace does not impart any scale to the surface. Added production steps include pointing, cold drawing, bright annealing and finishing.

Coupons cut from the ends of the tubes are tested mechanically. One coupon is flattened, with the weld at the flattened edge. Another coupon is expanded, while still a third coupon is reverse flattened. To pass the test, coupons must not crack or split in the tube metal nor open at the weld.



SINGLE STRUCTURE: Heat-treated weld joint (right) shows the effect of normalizing on the grain structure of new welded tubing.



BRIGHT ANNEALING: A shiny, scale-free surface is added to welded tubing in the new controlled-atmosphere bright-annealing furnace.

Process Detects Metal Buildups In Industrial-Waste Fluids

Metal concentrations create costly headaches when they enter a city's sewage system.

Concentrations must be kept to a minimum. A new program offers the controls needed.

- A major advance in the control of chemical-waste contamination centers on a new laboratory development. It's a spectrochemical process for analyzing effluent samples.

This process, developed at the Truck and Coach Div., General Motors Corp., Pontiac, Mich., combines chemical and spectrographic methods. GMC uses the process to analyze quickly and accurately the concentration of metals that originate from metal plating.

F. L. Racine, GMC's chief chemist, says that he has received many requests for details from engineers who plan to adopt the program in their plants.

Improves Waste Control—"These men feel," Mr. Racine states, "that the new process will contribute a great deal to industrial-waste control." He adds, "This will help to prevent harmful solutions from finding their way into city sewage systems."

The program now monitors the copper, zinc, chromium and nickel content in waste effluents. However, it offers potential usage for other metals.

"We put lithium nitrate in the waste-effluent sample, then we cook the sample until evaporation takes place," Mr. Racine explains. "The remaining salts are burned electrically in a spectrograph."

Each metal gives off a different light. These light beams are recorded on film. From the film, lab technicians determine the amount of each metal in the sample.

Fast and Accurate—This system is more accurate than hand-testing methods. And, it's a lot faster. It requires only one-tenth the time of the older test methods.

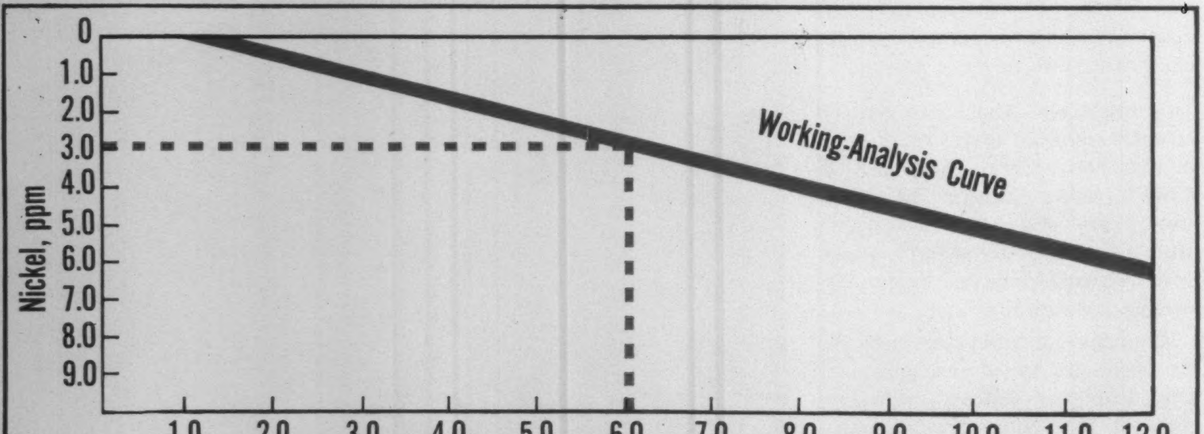
"We cover more ground over the same time period and we get even better analyses," Mr. Racine reports. "This, of course, adds a new safety factor to our waste-control program."

At the Truck and Coach Div., samples of waste are taken several times daily at three check points. These samples are rushed to the chemical lab for analysis. If the lab reports any increase in metal concentrations, corrective action takes place, with no time lag.

Here's a quick rundown on the new program. Effluent samples, adjusted to a pH 2 or 3 with hydrochloric acid, are placed in clean, 300-ml plastic containers.

Next, a lab technician places 100-ml portions of the samples in

How to Use Working-Analysis Curve



CHECK NICKEL CONTENT: The ratios found in analyzing submitted samples are plotted on a working-analysis curve. For this curve, a ratio of 6.0 indicates that 3-ppm of nickel are present in the waste effluent.

Prepare Your Own Standard Solutions

These Stock Solutions . . . .

FOR COPPER—Dissolve 0.393-g $CuSO_4 \cdot 5H_2O$ and dilute to 1000 ml with H_2O.
FOR NICKEL—Dissolve 0.448-g $NiSo_4 \cdot 6H_2O$ and dilute to 1000 ml with H_2O.
FOR CHROMIUM—Dissolve 0.282-g of $K_2Cr_2O_7$ and dilute to 1000 ml with H_2O.
FOR ZINC—Dissolve 0.455-g of $Zn\ (NO_3)_2 \cdot 6\ H_2O$ and dilute to 1000 ml with H_2O.

. . . . become Essential Standards

Note: Each solution represents 100 ppm. The stock solutions are diluted to obtain the various levels of concentration desired by adding the amounts of H_2O shown at the bottom. All computations are based on a 100-ml effluent sample.

Stock Solution, + ml	H_2O, ml	= ppm
1	99	1
5	95	5
10	90	10
25	75	25
50	50	50

clean, 150-ml beakers. He adds 2-ml of nitric acid, 4-ml of hydrochloric acid and 1-ml of 1 pct lithium-nitrate solution to each beaker.

Use Internal Standard—Lithium serves as an internal standard. The use of an internal standard overcomes non-uniformity of excitation. This prevents any variations from affecting both the spectral line from an element and the internal standard's spectral line in the same way.

If excitation is less than normal, both lines become weaker than normal even if the concentrations are the same. Within limits, however, the ratio of their intensities remains similar.

The technician heats the samples just to the point of dryness. Baking must be avoided. Then he takes the beakers to the spectrographic lab.

In the spectrographic lab, he mixes 1-ml of 1:1 hydrochloric acid with the dried salts in the beakers. He places one drop of this mixture in a shallow cup on a ¼-in. center-post graphite electrode. Then by using a conical-tipped counter electrode, he excites the mixture for 40 seconds with a direct-current arc.

Record Spectra—All spectra are next recorded on film. When the films are developed, spectrograms are obtained. The technician uses a densitometer to check line intensities. Using the same procedure, he also checks standard solutions.

Working, or analysis, curves are obtained by plotting element-line intensities versus the internal-standard lithium-spectral line. The ratios that the technician obtains from the samples are then plotted on these curves to obtain element concentrations.

Check pH Values—The sample used to check the concentration of the four metals can't serve for investigating the presence of cyanide or oil or the pH value. Why? Because acid has been added to the sample. Therefore, the latter data must be obtained by chemical procedures. This calls for a different sampling method.

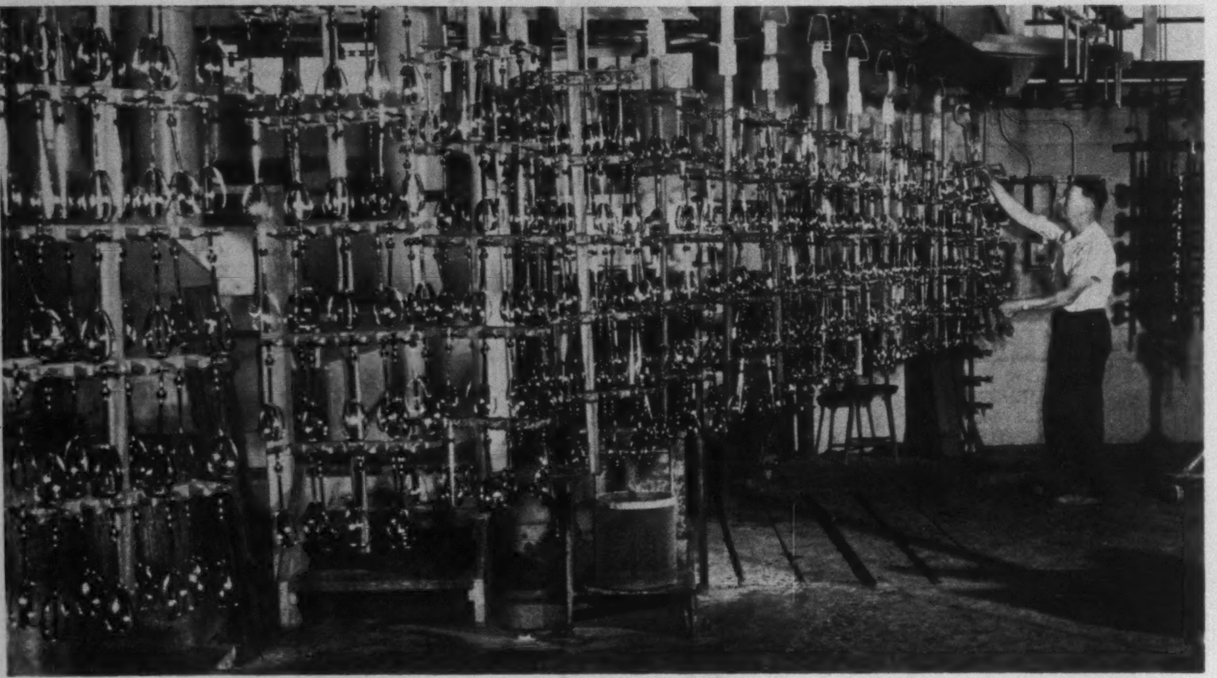
Stock solutions are made for copper, nickel, chromium and zinc. Each solution represents a concentration of 100 ppm. Dilution of these solutions produces various standard levels of concentration. GMC's standard and stock solutions appear in table form.

If other metals are present in the effluent, other standard solutions can be made.

So far, copper, nickel, chromium and zinc have been the four metals determined in the effluent samples. There's no reason why the presence of other metals can't be checked. The spectrogram shows all of the lines that are recorded.

Note Spectral Data

	Densitometer Spectral Line Value, Å
For Copper	
1-100 ppm	2618.4
For Nickel	
1-10 ppm	3050.8
10-100 ppm	3045.0
For Chromium	
1-10 ppm	2835.6
10-100 ppm	2712.3
For Zinc	
1-100 ppm	3282.3
For Lithium	
Internal Standard	2741.3



STEADY FLOW: The automated system, used along with a chemical brightener, cuts manpower requirements.

Plating Costs Tumble Sharply On Lustrous Chrome Line

Is the payoff in automation measurable?

Here's a case where it is. What's more, the gains pile up long after the original installation swung into production.

▪ Savings in a plant can pyramid by using cost-cutting ideas that are dependent upon their predecessors. That's the experience of one appliance maker who began by reducing the cost of supplies 7¢ per unit on plating toaster shells alone.

The savings mount annually to a sum in excess of $15,000 for Hamilton Beach, div., Scovill Mfg. Co., Racine, Wis.

Acutely aware of product appearance and quality needs, the company exercises extreme care in its plating section. Much of the success of end-products in general markets, of course, depends on visual qualities.

Integrate Processes—The company's plating facilities were a modern, integrated complex of plating machines. The setup also included cleaning and drying units along with ball burnishing and buffing sections.

The company decided there was still room for improvement and acted on the recommendation of G. N. Harrington, its factory manager. This was to install a new bright nickel plating process, developed by The Udylite Corp., Detroit.

The unusual self-leveling properties of Bright Nickel #66 plating solution ended buffing needs on work between the nickel and chrome baths. Savings came to $124 plus overhead for each lot of 700 toaster shells. The need for plating personnel was reduced from six to four men.

The only physical change was an extension of the conveyor system to handle increased production. Thus, the cost of the change was negligible. The entire installation was built in two weeks.

Boosts Production—Conversion to the newer process stepped up the production rate substantially. Because the automatic plating machine gave excess capacity—more than 70 pct of an eight hour shift—Hamilton Beach saw it could make further gains by moving the beater plating job from a hand plating area to the full-automatic machine.

Originally, the beaters were pickled and ball burnished to bring up surface luster, prior to plating. Transfer to the automatic handling along with the new plating solution eliminated the two-man ball burnishing department.

Takes More Jobs—The gain in output gave engineers a chance to transfer 30 additional appliance components from hand plating setups to the automatic line. Also, it formerly was necessary to copper plate many of the components and follow up with a buff to cover defects.

Self-leveling quality of the newer plating method eliminated both the copper plating and buffing. Two more employees were deployed elsewhere in the plant. Production on the automatic line jumped to 18,000-20,000 parts per day — an average of 100 plating racks per hour.

Better Inspection—The increase in output allowed a reorganization in the inspection department on the second floor of the plant. A special unit of inspectors was brought down to the lower level and placed next to the chrome plating machine. Here, a visual check could be made on parts right from the chromic bath.

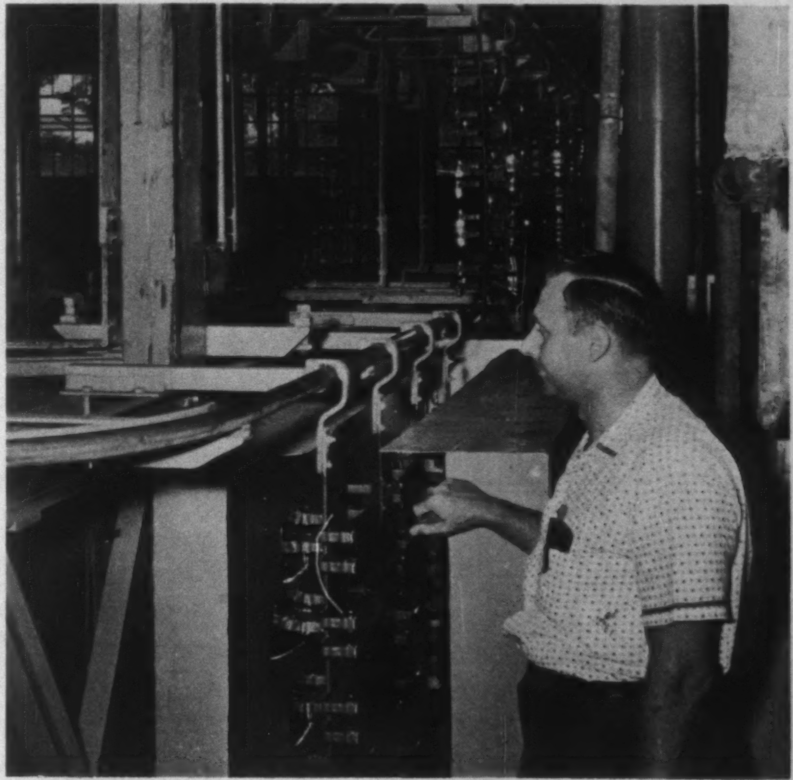
On-line checking eliminated two crating operations as well as trucking and handling. Parts formerly sent to the second floor for assembly and shipping are now processed within minutes after plating.

This time-saving system netted a 25-pct cut in operating costs for the inspection department. Actually, there was an improvement in control of quality, too, in the new setup —a double gain.

Other Changes — Incidental to changing solutions was the use of a new chemical. It's a tiny tablet that looks and fizzes like a bicarbonate of soda. The chemical developed by Udylite eliminates the mist and spray of chromic acid that rises from chrome plating tanks.

In this installation, Zero Mist reduces the loss of acid and eliminates entirely a potential health hazard.

BRIGHT FINISH: Special chemical brightener eliminates buffing the work between the nickel and chrome baths. The result: increased savings.



LARGER LOTS: Manual setups limit production to job-lot handling. Conveyors streamline processing, cut handling losses, save space and time.

How to Store Stainless Steel

High quality goods require high quality care. Stainless steel is no exception to that rule.

A few simple storage rules, if followed, will keep the material in shape 'til you're ready for it.

▪ How do you store your stainless tubing or pipe? This question is important to you—especially if the period of storage is likely to be a long time.

Stainless steel has a reputation for being highly resistant to corrosion and abrasion—this is true. But some people often regard the metal as indestructible. This kind of thinking can cost the user money.

Like any good product, stainless tubing and pipe should be stored with reasonable care. Here are some storage tips recommended by The Carpenter Steel Co., Alloy Tube Div., Union, N. J.

Use Correct Racks — Provide racks for stainless pipe and tubing, both when the material reaches the plant and when it's standing by for fabrication. It's surprising how often this simple step is overlooked.

For proper storage, use either wood or thoroughly painted iron racks. Unpainted iron racks allow iron particles to impregnate the stainless. This causes small pits.

Never store stainless tubing or pipe on bare galvanized surfaces or in the same bins with galvanized pipe. The sliding of stainless over a zinc surface can be harmful especially if the stainless is later heated during fabrication or use.

Avoid the use of galvanized iron racks unless they are painted or covered with wood.

Beware of Moisture — Moisture by itself is not harmful to stainless. But when it contains chemical fumes, dust, or other contaminants, moisture can be very destructive.

One good point to remember: The fumes or dust may not result from your own operations. A nearby plant's waste can also contaminate your stainless in storage. So, keep your stainless both clean and dry.

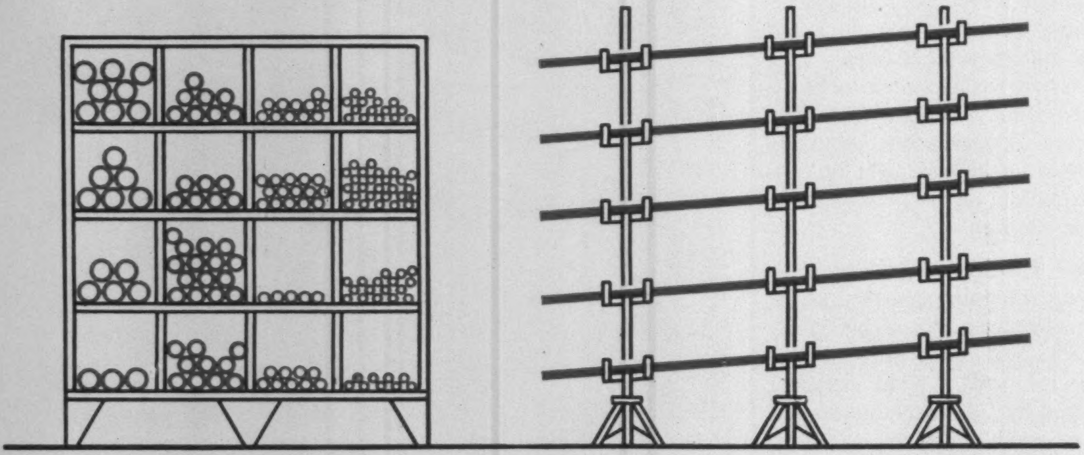
Moisture buildup in pockets or crevices can become the breeding ground for surface pitting. For proper drainage and quick drying in outdoor storage, tilt the racks.

Ideal conditions call for outside storage racks with separators or bins to provide air space between small groups of tubes.

Physical Damage — Stainless products are tough and strong. But you are inviting damage if you allow pipe and tubing to be exposed to areas where lift trucks or cranes are operating.

Instruct materials handling personnel to handle stainless tubing with reasonable care. Avoid placing other material on top of tubing or otherwise exposing it to possible damage. If your company uses polished tubing, keep the protective wrapping on until the tube is ready for fabrication.

Design Storage Racks to Fit the Environment



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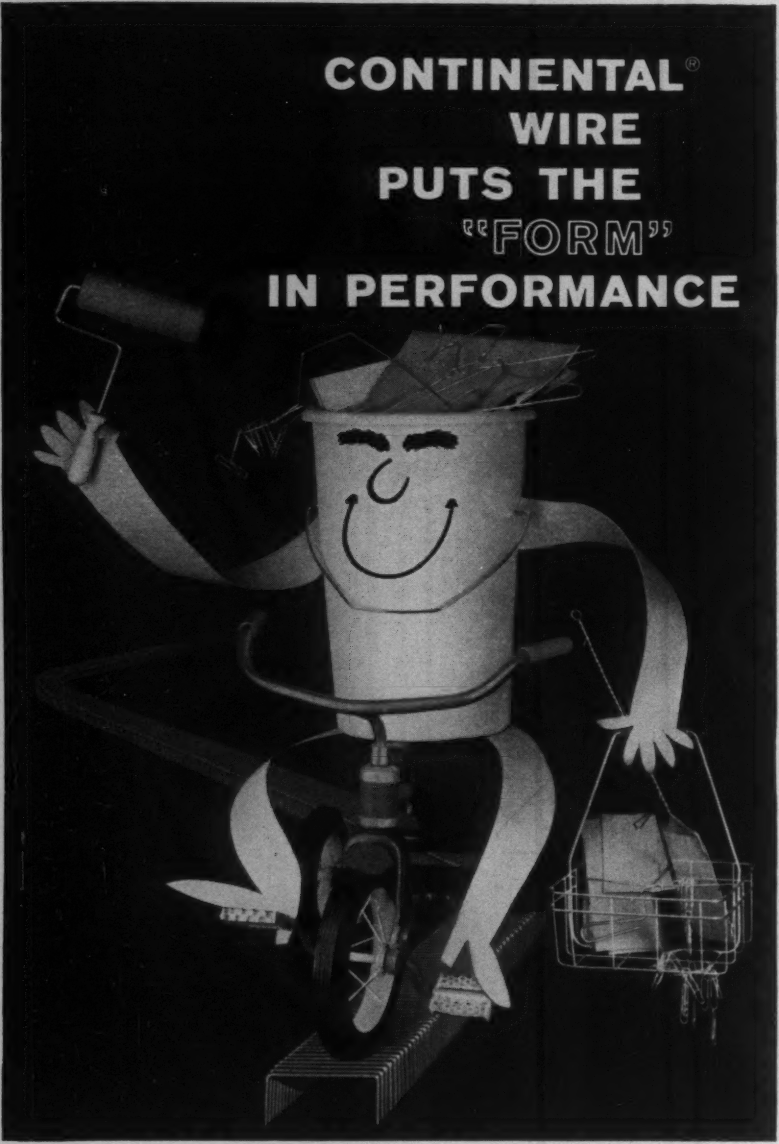
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PATENT REVIEW

New Patents In Metalworking

Strong Hearth

Furnace pallets, F. J. Boron (assigned to American Brake Shoe Co., New York), Oct. 11, 1960. In an apparatus for the sintering of iron ore, the usual grates are replaced by a flexible, open-mesh, chain-type hearth consisting of articulated links. The links can expand and contract individually, thereby not being as quickly warped and broken as are cast iron sections. No. 2,955,812.

Alloy Resists Stress

Austenitic alloy steel, M. Korchynsky and W. Crafts (assigned to Union Carbide Corp., New York), Oct. 4, 1960. An austenitic alloy steel is suitable for use in wrought and cast condition. The alloy possesses excellent stress resistance properties at high temperatures. It consists preferably of 15-20 pct Cr, 13-17 pct Mn, 8-12 pct Ni, 3-5 pct Mo, 1.5-2.5 pct W, 0.2-0.35 pct N, 0.3-0.5 pct C, and the balance essentially all Fe. No. 2,955,034.

Puts Gas in Metal Bath

. Method and means for blowing gases containing possible pulverulent material into a bath of molten metal, M. Allard (assigned to Institut de Recherches de la Siderurgie, Saint - Germain - en - Laye, France), Oct. 18, 1960. Simplified method injects a gas into cast iron that is being converted into steel by the Bessemer or Thomas methods; without any transfer and without the use of a lance. The gas is injected at the lower end of the ladle. No. 2,956,794.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

Western Electric feeds a varied diet to its new Bliss cold mill

Each year, about 30 million pounds of metal pass through the new Bliss cold breakdown mill at Western Electric's Hawthorne, Illinois plant. They include both ferrous alloys like Western Electric's Permalloy and a wide variety of non-ferrous materials such as brass, nickel silver and phosphor bronze. No matter what they are, the mill reduces them with ease and precision.

The 12″ and 28″ x 18″ mill is capable of reducing non-ferrous metals from an incoming thickness of .410″ to a finished gauge of .060″ and the special ferrous materials from an incoming thickness of .360″ to a finish gauge of .125″ at speeds up to 300 fpm."

Bliss supplied more than a mill to Western Electric. To meet the customer's particular needs, it designed and built the unique auxiliary equipment, including an inside and outside runaround conveying system, a special turn ender and a specially designed feed unit permitting off-center rolling of narrow material. "Tailoring" mills and equipment to the specific needs of the user is a Bliss specialty. For other examples of this "know-how" in mill design and installations, write for our 84-page Rolling Mill Brochure, Catalog 40-B.

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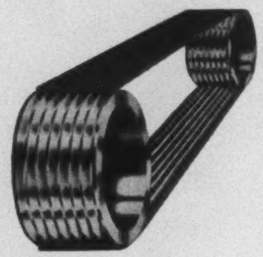

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Write for Bulletin M141

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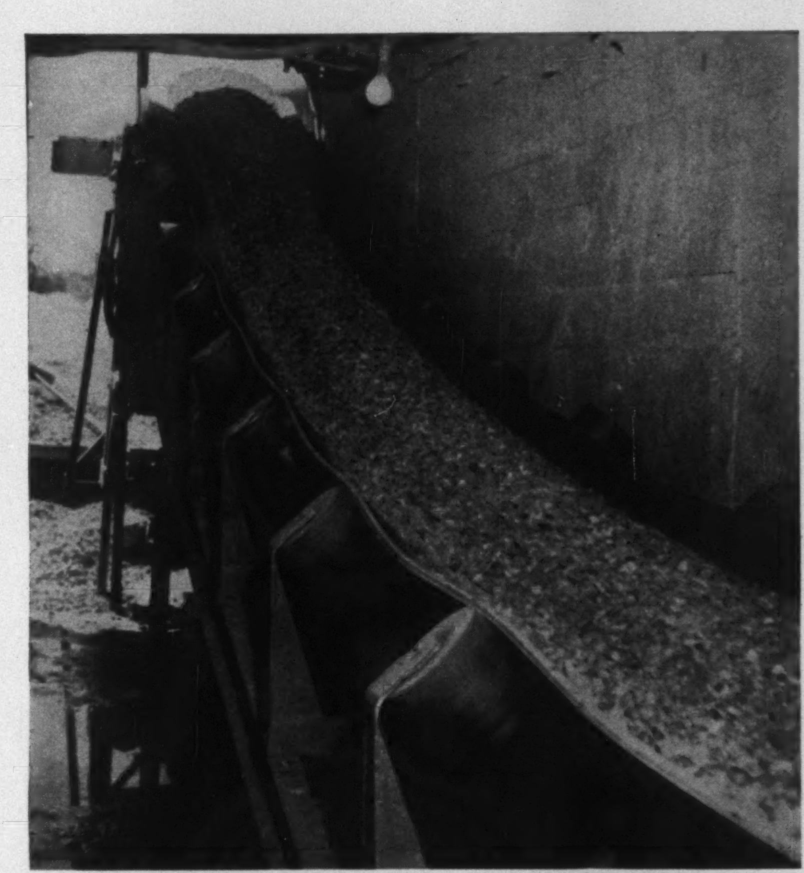

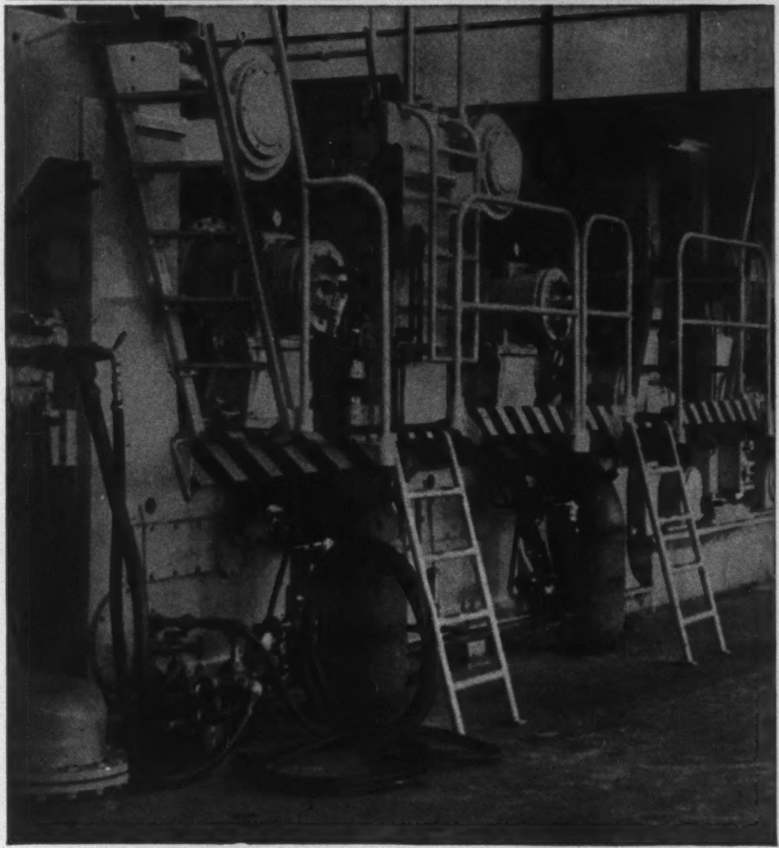

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- **REQUIRES NO BREAKER PLY**
- **DOUBLE COMPENSATION RELIEVES OUTER PLY STRESS**
- **EXCLUSIVE "XDC" LONG-WEAR COVER**

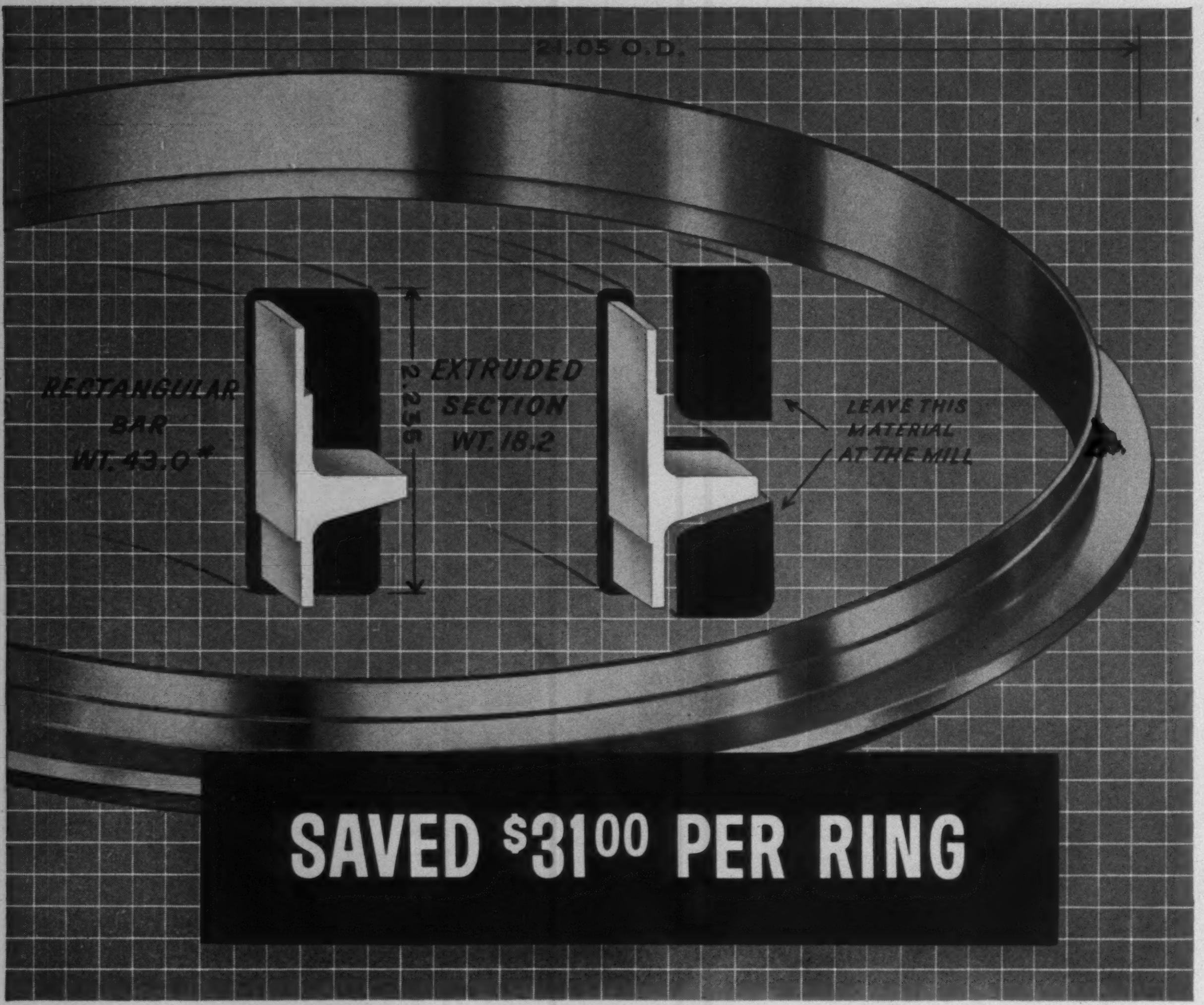
Every component of a Ray-Man Conveyor Belt is *precision proportioned* to give you a balanced belt construction, with as much as ⅓ longer life expectancy. It's the same as getting ⅓ more conveyor belt for your money. Further savings are possible, if you use 45° Idlers. Properly engineered, you can haul a fuller load, or install a narrower conveyor. Ray-Man is guaranteed against ply or cover separation at the hinge line where the 45° angle proves too sharp for regular belt constructions. Write for Bulletin M303.

HOMOFLEX HOSE

more flexible, weighs less than any hose for equal pressure

- **SUPER-STRONG**
- **PRECISION BUILT**
- **NO PRE-SET TWIST—WILL NOT KINK**
- **INSEPARABLE TUBE-TO-COVER BOND**
- **UNIFORM INSIDE AND OUTSIDE DIAMETERS**
- **EASIER, SAFER COUPLING**

Strong, lightweight, and "flexible as a rope"—Homoflex is the easiest handling hose and lasts longer. Made in types for air, water, other fluids and gases. Ask about other types of R/M rubber hose for your job applications. Write for Bulletins M620 and M694.


21.05 O.D.
RECTANGULAR BAR WT. 43.0#
2.235
EXTRUDED SECTION WT. 18.2
LEAVE THIS MATERIAL AT THE MILL
SAVED $^{\$}31^{00}$ PER RING

18 lbs. of stainless per ring eliminated by flash butt-welding extruded sections

Amweld experience in forming and flash butt-welding rings from extruded sections reduced the cost of $52.00 rings to $21.00 each. A special section closely approximating the cross-section of the finished part was selected to replace heavy rectangular bar stock. By leaving over 12,000 lbs. at the mill, the cost of these rings was reduced by 40%—not to mention large savings in machining time.

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 120 DIETZ ROAD • WARREN, OHIO

FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Stainless Steel Welding

Data on welding stainless steel is given in a 24-page manual. It functions as a general reference guide on the entire subject of stainless steel welding. Detailed explanations are given on the various stainless steels in common use today. (The McKay Co.)

For free copy circle No. 1 on postcard

Iron Powder

Dealing with iron powder, a technical data bulletin reports the results of extensive tests on grades of the company's iron powder. The results are in the form of performance graphs and tabular listings. (Alan Wood Steel Co.)

For free copy circle No. 2 on postcard

HydraulicPlatenPresses

Described in a 12-page catalog are hydraulic platen presses. The catalog includes specifications and descriptions of presses from 25-500 tons capacity. (Danly Machine Specialties, Inc.)

For free copy circle No. 3 on postcard

Automatic Turret Lathe

Pictured and described in a short brochure is an automatic turret lathe. The lathe is for both bar and chucking work. The unit's headstock and controls are also illustrated and described. (Jones & Lamson Machine Co.)

For free copy circle No. 4 on postcard

Machine Tools

A 16-page catalog lists all items in a line of machine tools. It explains the important features added to the company's precision surface grinder, the 6-in. rotary grinder, 24-in. semi-automatic lapping machine, 24-in. rotary lapping machine and a back spot facing machine. (Taft-Peirce Mfg. Co.)

For free copy circle No. 5 on postcard

Conforming Metal

Outlined in a circular are the advantages of a specialized service. It is the production to specification of metal strips into required uniform cross-sectional shapes. (Prontour Co.)

For free copy circle No. 6 on postcard

Flaw Detector

For non-destructive testing of cold-drawn coiled wire, a magnetic analysis unit is described in a four-page catalog. The catalog discusses application, operation and versatility of the tester. (The Magnetic Analysis Corp.)

For free copy circle No. 7 on postcard

Hard Anodize Unit

Desk size, a multi-purpose electolytic process unit is described in a four-page bulletin. The unit prepares hard-anodized samples. It also serves well for plating or electrochemical milling. (Allen Aircraft Products, Inc.)

For free copy circle No. 8 on postcard

Bronzeless Golds

Simulating the appearance of fine bronze powders, bronzeless gold spray finish is dealt with in a folder. The folder gives product data on the bronzeless gold systems for metals and thermoplastics. Color chips of standard colors are also supplied. (Bee Chemical Co.)

For free copy circle No. 9 on postcard

Spiral Spacer

A universal-type spiral spacer is described in a four-page brochure. The unit is for use when joining crushable panels to other parts or panels. The illustrated brochure outlines the many potential uses for the spacer. A variety of typical

---

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FREE LITERATURE

applications with cross-section line drawings is also supplied. (Huck Mfg. Co.)

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Infrared Pyrometers

Described in a four-page technical bulletin are industrial infrared radiation pyrometers. For permanent installation or portable use, the pyrometers provide non-contact control to an accuracy of ±1 pct. Complete specifications on the pyrometer head and control indicator are shown. (Servo Corp. of America)

For free copy circle No. 11 on postcard

Air Receivers

Air receivers for truck-mounted compressors are described and pictured in a brief catalog. (Kargard Co.)

For free copy circle No. 12 on postcard

Gear Checkers

Described and illustrated in a four-page catalog are automatic gear checkers and classifiers, along with simplified gear rolling fixtures. An involute profile checking machine is also described and illustrated in detail. (National Broach & Machine Co.)

For free copy circle No. 13 on postcard

Tools, Special Machines

The manufacturer's tool and special machine work are presented in an illustrated folder. Shop photographs show the plant's modern facilities for the design and building of complex tooling and special-application machinery. (Mechanical Specialties Co.)

For free copy circle No. 14 on postcard

Alloy Iron Properties

The engineering properties of Meehanite Metal, Ni-Resist Iron, Ni-Resist Ductile Iron and Ductile Iron are charted in a bulletin. Mechanical and physical properties given cover a wide range of centrifugally cast irons. (The Shenango Furnace Co.)

For free copy circle No. 15 on postcard

Speed Measurement

Tachometers is the subject matter of a 12-page catalog. The literature contains photographs, drawings and descriptions of 19 distinct types of tachometers. Also included are drawings of various types of flexible shafts and drives. In addition, there are drawings of various drive arrangements. (Jones Motorola Corp.)

For free copy circle No. 16 on postcard

Belt Grinders

Oscillating belt grinders and a sheet surfacer are described in detail in a brochure. Typical applications and specifications are also given. (Sales Service Mfg. Co.)

For free copy circle No. 17 on postcard

Ways to Package

A pocket-size 40-page booklet relates better ways to package, unitize and ship. New material includes descriptions of the company's compression strapping and jib crane systems. (Signode Steel Strapping Co.)

For free copy circle No. 18 on postcard

Swaging Information

Basic information about swaging is contained in a 16-page booklet. It includes sections on what swaging is; what can be swaged; metallurgical effects of swaging; selecting swaging equipment; tooling and feeding swagers. (The Fenn Mfg. Co.)

For free copy circle No. 19 on postcard

Wrap Prevents Rust

A colorful booklet shows how the company's wrap prevents rust on metal parts and products. (Ludlow Papers)

For free copy circle No. 20 on postcard

Industrial Financing

File size, a brochure non-technically describes modern industrial financing practice. Some of the items included in the booklet are: factoring, equipment loans, inventory loans and acquisitions. (For free copy, write on company letterhead to Walter E. Heller & Co., 105 W. Adams St., Chicago 90)

Reproduces Drawings

An engineering-drawings reproducing machine is described and illustrated in a four-page brochure. On insertion of a sheet of ordinary paper, the printer turns out a dry, positive engineering print up to 18x24 in. The print is made from a microfilm frame mounted in a data-processing frame. (Haloid Xerox Inc.)

For free copy circle No. 21 on postcard

JONES & LAMSON
MACHINE COMPANY

the man who needs
a new machine tool is
already paying for it

If you don't buy now . . . You'll pay later

You can bank on it. If you don't buy new production equipment now, you *surely* will pay later, and the price will be high in more ways than one.

The recent Machine Tool Exposition in Chicago demonstrated beyond a doubt that production economics *and* production techniques are undergoing rapid and sweeping changes.

As a result, production management is faced by two big jobs, 1.) Deciding *which* items of new, advanced equipment are best suited to individual plant requirements, and 2.) convincing top management that this new equipment *must* be acquired, and that it can be paid for easily in a way best suited to your needs.

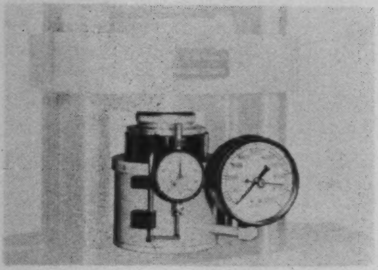
Jones & Lamson can help you with this twofold problem. First, the new J&L line of machines is broad in application over a great variety of operations. Second, these machines will pay for themselves out of Profitivity®, and can be leased at an hourly rate of $2.50 per $20,000 of machine value: There's no advance payment, and the hourly rate drops to 12½¢ after five years.

Literature telling about the machines, how to justify their purchase, and how to pay for them, is yours for the asking.

Write to Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

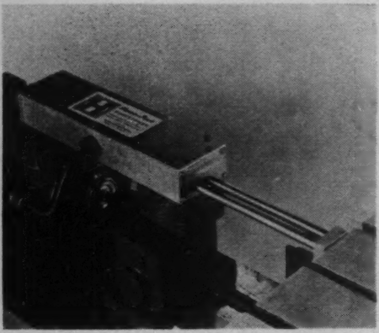
New Materials and Components



Adapter Lets Compression Units Test Ductility

Self-contained, an adapter unit permits existing compression equipment to make ductility tests on sheet metal. The sheet metal can be up to 1/16-in. thick. The result of over a year of development work, the tester cell weighs 22 lb. Used with a wide variety of compression loading equipment, it performs ball punch and cup type ductility tests. Company tests show that this unit offers results as accurate as those of machines costing much more than this unit. (Detroit Testing Machine Co.)

For more data circle No. 1 on postcard, p. 193



Control Automatically Positions Many Mechanisms

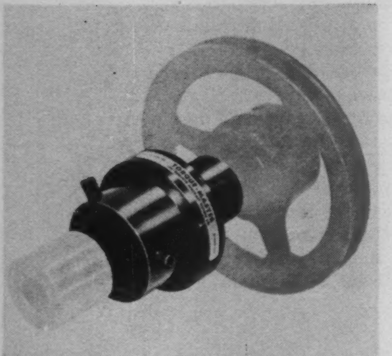
An electrical - mechanical servo device automatically positions machine tools, valves, float levels, doors and hopper gates. It does this at any of several pre-determined positions. It positions in respect to a control selector switch signal. The positioner has two cam rods. A connecting link on one end attaches to the mechanism it's controlling. The other two ends of the steel cam rods trip limit switches as the cam rods slide back and forth. The servo action takes place as the end of the positioner cam rod moves for the position requested by the position selector switch. The positioner achieves accuracies of ±0.005 in. (Hanna Engineering Works)

For more data circle No. 2 on postcard, p. 193

Machine Used With Gage Tooling Provides Control

Transistorized operated, a machine provides automatic control of plunge cut and internal grinding operation. Models in the line cover single or double limit control of inside-diameter or outside-diameter grinders. The use of transistors in the unit improves reliability through longer operational life. Transistor use also results in lower power consumption and negligible heat generation. Each control unit is fail-safe, pneumatically and electrically. Loss of either air pressure or electrical power automatically retracts the grinding wheel. Built-in testing facilities permit rapid tracing and isolation of trouble. (Federal Products Corp.)

For more data circle No. 3 on postcard, p. 193

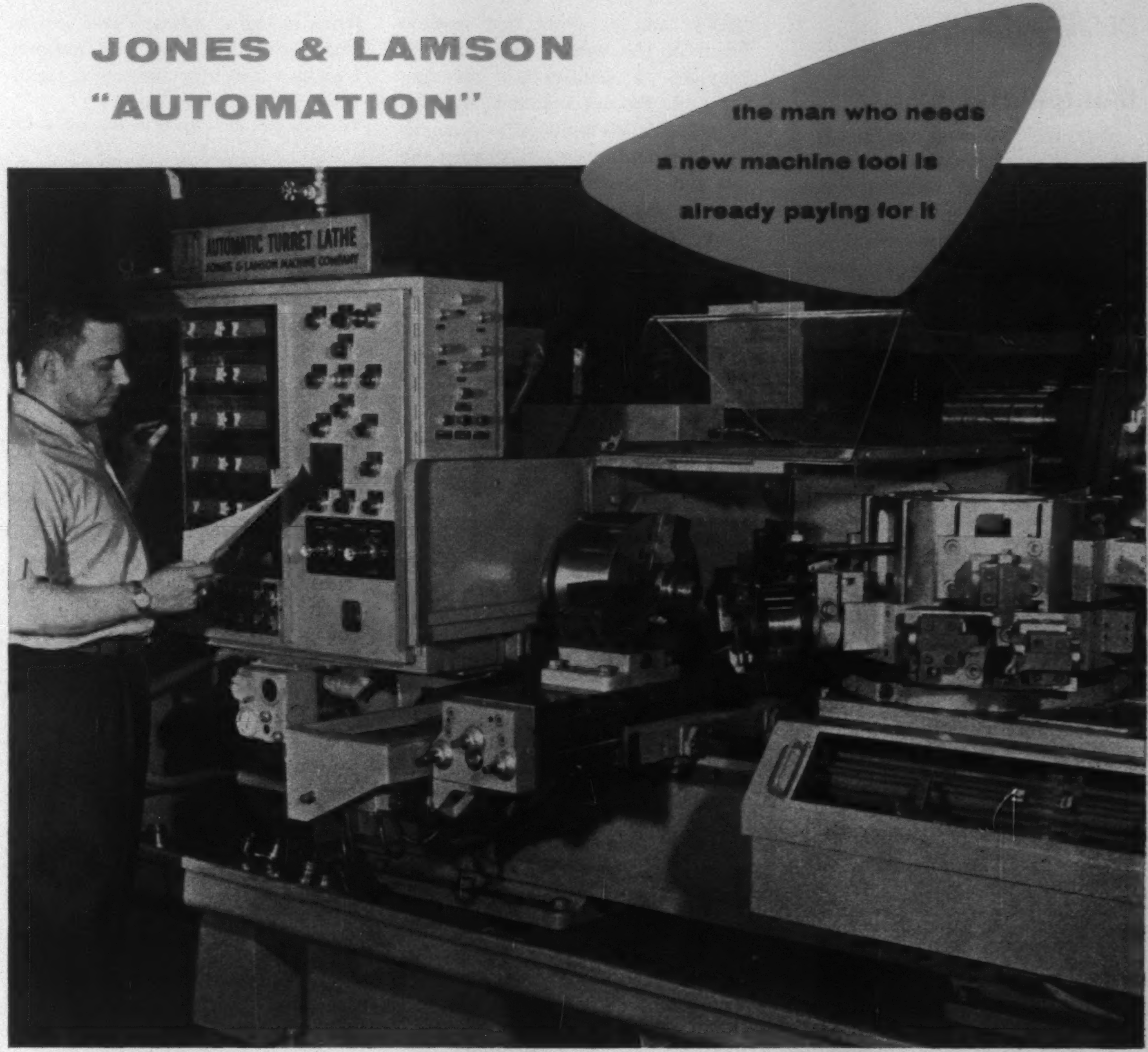


Device Prevents Damage to Motors and Drives

By instantly disengaging power, upon overload and jam-ups, a torque limiter helps to protect motors and drives against damage. Interchangeable bushings are used from ½ to 1-7/16 in. bores. Single, double and triple groove sheaves and sprockets fit without machining. Timing belt sheaves and rotating members mount easily. The device acts as an automatic shear-pin mechanism. It slips only when a jam-up occurs. It re-engages when overload is relieved. Torque output remains constant when exposed to changing temperatures, weather, oil and abrasive conditions. Reversible, hardened steel wear plate doubles the life before a new plate is needed. (Roberts Aircraft Engine Co.)

For more data circle No. 4 on postcard, p. 193

JONES & LAMSON "AUTOMATION"



Completely automatic turret lathe gives peak production efficiency

J & L's new, completely automatic turret lathe sets a new high standard of efficiency for both bar and chuck work. Now, for the first time, you have the versatility of turret lathe tooling combined with completely automatic operation. All machine functions and sequences are pre-selected and programmed by the operator or set-up man, from a staging panel during initial set-up.

The automatic machine characteristics of this new lathe include fast motion, variable speed selection, spindle speed selection, turret indexing, coolant on and off, bar feed, and cycle stop.

A noteworthy feature is the automatic operation of a 12-speed hydraulic clutch headstock combined with a 24″ saddle motion which is actuated by a closed-loop, two-stage hydraulic servo system.

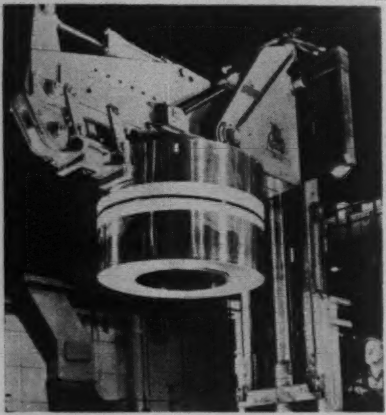
The cross slide has a 14½″ stroke and drive similar to that of the saddle, and has several automatic cycles, as programmed from the staging panel. Three speed ranges are available: 20 to 1000; 30 to 1500; and 40 to 2000 RPM. Power is from a single speed motor (up to 40 HP). Feed range is from .750″ per minute to 30″ per minute for the saddle, and from .375″ per minute to 15″ per minute for the cross slide.

Send now for our folder on this remarkable new machine. Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vt.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

Manipulates Coils

Adaptable to any standard fork truck, a coil manipulator grabs coiled metal stock weighing up to 6000 lb. It lifts it and inverts it from a horizontal to a vertical position, in one operation. High-pressure clamps adjust to any coil size and curvature while holding the coil securely. The truck can then move to any desired position. The coil handler permits more efficient use of floor space. The coils may be stacked to the height of the fork truck lift. (A Grand Co.)



For more data circle No. 5 on postcard, p. 193

Matte Finish

Wrought and extruded aluminum alloys can be treated in a special process to obtain a very white matte finish. The surface makes a good contrast when used with polished finishes. The process masks surface scratches and extrusion lines. This process eliminates costly polishing operations prior to anodizing or lacquering. A dip process, simple to operate and control, produces the matte finish. (Frederick Gumm Chemical Co., Inc.)

For more data circle No. 6 on postcard, p. 193

Hydraulic Nut

For use in screw-driven machines and mechanisms, a hydraulic take-up, Acme screw nut eliminates backlash. It does this even after excessive wear of the threads. With no backlash, there are no vibrations, chatter and resulting bad surface finish of the work. The nut also provides a continuous breaking force. In the nut assembly, hydraulic pressure is employed to continuously maintain contact between the nut and screw threads, without excessive friction. (Tracer Control Co.)

For more data circle No. 7 on postcard, p. 193

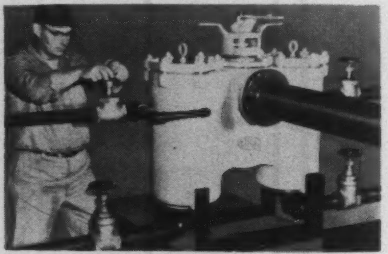
Aluminum Spray Paint

Packed in an aerosol can, aluminum spray paint withstands a temperature of 1000°F for intermittent periods. It withstands a temperature of 500°F indefinitely. (Sprayon Products, Inc.)

For more data circle No. 8 on postcard, p. 193

Pipeline Strainers

As much as 90-pct savings in labor are possible with a new line of pipeline strainers. There are no bolts, covers or straining elements to remove or replace for cleaning. The units can be cleaned free of accumulated debris in one-tenth the time required of manually-cleaned units. A reverse flow of "backwash" fluid literally rinses the strainer free of all foreign matter, at the turn of a valve. It discharges debris-laden waste directly into existing drainage system. (Zurn Industries, Inc.)



For more data circle No. 9 on postcard, p. 193

Gear Box

Designed as a developmental speed reducer and increaser, with ten basic ratios, a gear box eliminates the need for a number of single ratio units. Standardized mounting dimensions insure quick and accurate assembly with all hangers, breadboard plates and development components. No tools or critical adjustments are necessary when changing ratios. These assemblies have less than 30 minutes backlash through the entire gear train. (PIC Design Corp.)

For more data circle No. 10 on postcard, p. 193

Cushions for Cylinders

Self-regulating, high-speed floating cushions for hydraulic cylinders permit much faster cycling. In high-speed cycling, the floating cushion plunger also acts as an extra-large check valve that allows comparatively large volumes of fluid to enter the cylinder around the piston rod. This speeds up the start of cylinder stroke in coming out of the cushion. It also eliminates the ball check assembly customarily used. These cushions come as an option throughout the company's complete line of hydraulic cylinders. (Flick-Reedy Corp.)

For more data circle No. 11 on postcard, p. 193

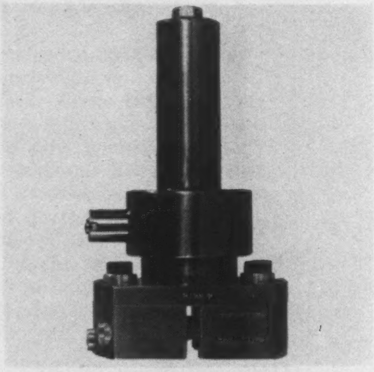
Foundry Parting Agent

Easily applied from its aerosol container, a foundry parting agent is particularly effective for parting urea cores made in dielectric furnaces from the core boxes. The agent can withstand high temperatures. This allows effective parting. The submicron particle sizes do not cause any build up on the cores or core boxes. (Allaco Products)

For more data circle No. 12 on postcard, p. 193

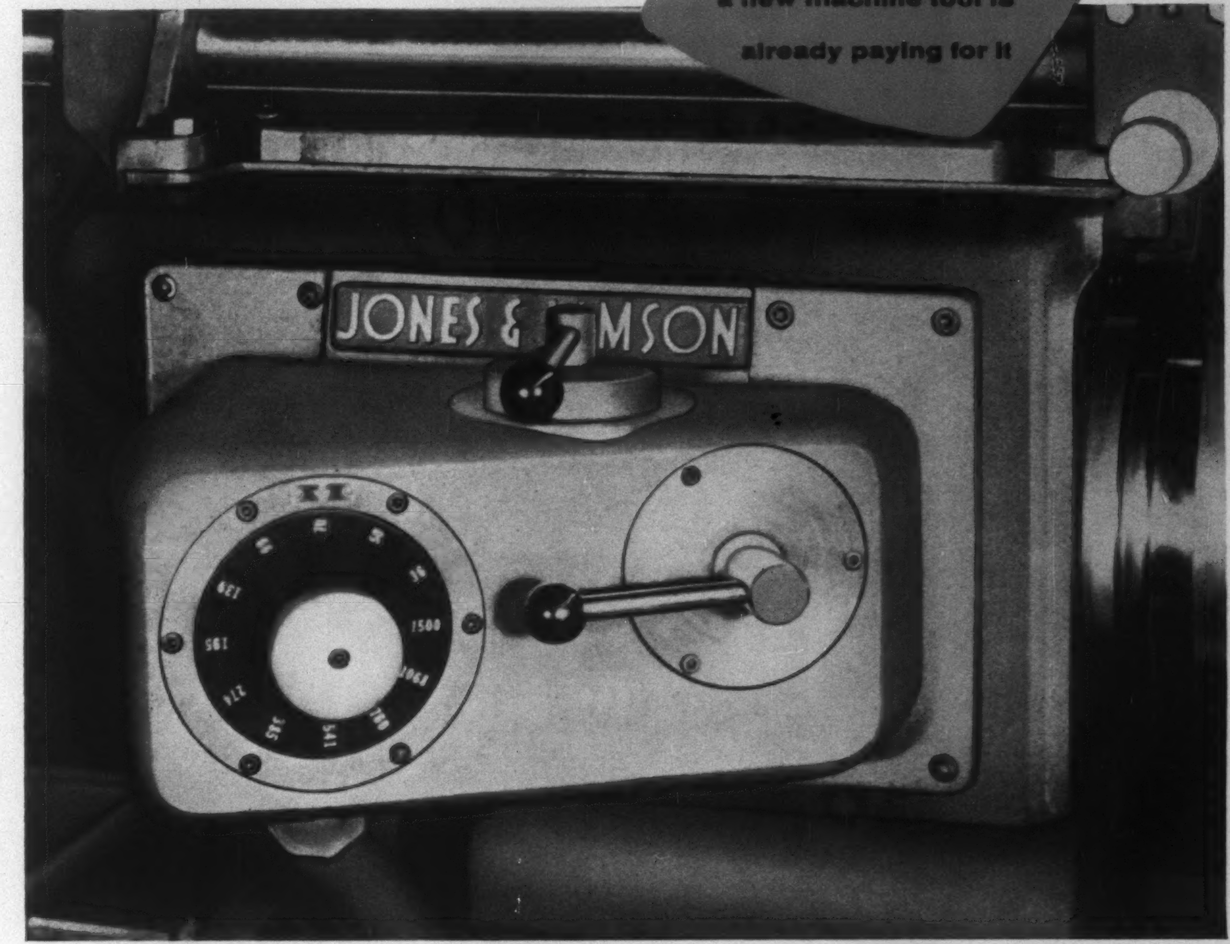
Adjustable Tap Holder

With a 1½-in. capacity, a combination releasing and non-releasing, completely floating tap holder can be used on turret lathes and automatics. A half turn of the tripping dog in the reversing mechanism



JONES & LAMSON
MACHINE TOOLS

the man who needs
a new machine tool is
already paying for it



New improved design for J & L Ram and Saddle Type Turret Lathes

These two new J & L lathes are *really* new. No mere face lifting here . . . both lathes have been completely redesigned from the floor up!

Both the Ram type and Saddle type lathes are equipped with a multi-speed hydraulic headstock, and are capable of giving you more chips per tool, more pieces per hour, and more profit per job.

The redesign of these machines starts with 41″ of leg depth for more stable footing. New cross-ribbed bed design provides even greater rigidity for heavy cuts — and gives straight-line chip disposal out the back. The new wide pan includes a built-in accessible coolant tank at the head end of the machine. The new headstock transmits up to 40 HP.

An extremely important feature is the hydraulically operated clutches, which change pre-selected spindle speeds instantly and automatically.

Other features include: motor mounted vertically on the rear of the machine; a new carriage of rugged design, on which the stop spool is more conveniently located; heavy duty aprons which allow the adaptation of full length lead screw threading attachments, as well as the extremely versatile 2-Dimension (180°) carriage tracer; built-in independent pumps, which supply forced lubrication to the aprons, carriage, and saddle.

Both of these new lathes offer more power, greater accuracy, and easier operation. Write today for details. Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vt.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

changes the direction of the tool instantly for right- or left-hand tapping. An extra tripping dog changes the tool from a releasing to a nonreleasing tap holder. Independently mounted sliding jaws provide 4- and 5-point holding. They move in a vertical direction so as to take 7/16-1½ in. tap sizes. Shank size is 1½ in. (RoyEl Tools, Inc.)

For more data circle No. 13 on postcard, p. 193

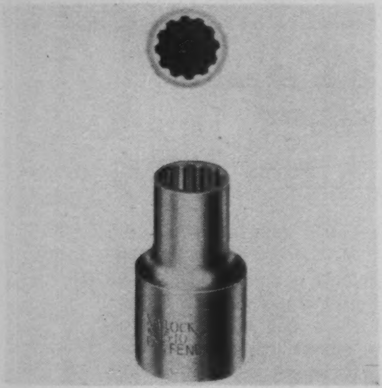
Levels Off Floor

An extension handle, on the lever valve controlling a hydraulic platform lift, enables a fork-truck operator to raise or lower himself from one split floor level to another. He can do this without leaving his seat. The platform lift is 6 x 8 ft. When in the down position, the platform descends into a floor recess so that the top is level with the surrounding floor. The unit can be powered by the plant's air line (at 100 psi). (Globe Hoist Co.)

For more data circle No. 14 on postcard, p. 193

No Socket Breakage

Costly socket breakage and wrenching failures are virtually eliminated by a new super torque socket. Lobes of the new socket grip the wrenching flats, instead of the points. This eliminates any tendency to slip or to round the points of either the nut or the socket. After being tested 100 times at more than double standard torque, the super torque socket was undamaged. The socket is made of heat-treated alloy steel. It comes in nickel and chrome-plated finishes. (Kaynar Mfg. Co., Inc.)



For more data circle No. 15 on postcard, p. 193

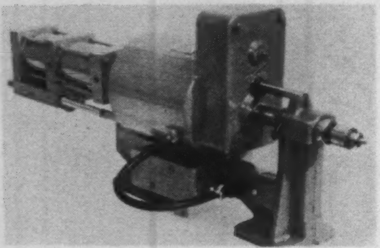
Room Cure Systems

Room temperature cure systems enable the user to follow conventional laminating and casting procedures without the necessity for curing ovens and time-consuming cure cycles. Completed tools can be fabricated at a fraction of the time and material costs of the heat cure systems. (Rezolin, Inc.)

For more data circle No. 16 on postcard, p. 193

Drills Small Holes

A 3½ in. stroke small-hole drilling unit has electric motor spindle and air feed with hydraulic control. Seven sets of timing belts and pulleys provide spindle speeds from 750-15,800 rpm. Chuck capacity is ¼ in. (The Electro Mechano Co.)



For more data circle No. 17 on postcard, p. 193

Rivets

Designed for both production manufacturing and for repair, new rivets have minimum blind side clearance. They adapt to different material thicknesses and positive hole fill, even in oversize or out-of-round holes. Rivet stems fracture cleanly and quickly. Trimming operations are eliminated. (Townsend Co.)

For more data circle No. 18 on postcard, p. 193

Aluminum Cleaner

Safe for cleaning aluminum, a cleaner can be used on any and all types of aluminum finish. The cleaner is neither acid or alkali. It is non-flammable and non-combustible. The cleaner removes grease, oil, tar, wax, waterspots, fingermarks, smog and smoke deposits. (Time Tested Products)

For more data circle No. 19 on postcard, p. 193

Transformer

Designed for the automated, processing and machinery control fields, a line of constant voltage transformers features short-circuit overload protection. It also offers rated voltage variations for both output and input functions. The units exhibit constant voltage outputs for low-voltage uses such as milling, grinding and electrical machinery controls. The transformers have an output capacity of 50 w. (Nytronics, Inc.)

For more data circle No. 20 on postcard, p. 193

Grouting Technique

For gas compressors, a new grouting technique eliminates foundation failures and costly damage. Quick setting, a resin-based grout provides a high-strength foundation virtually impervious to oils, most acids and alkalis. It has a tensile strength of 1950 psi and a compression strength of 15,000 psi. This insures uniform support, transmittal of vertical and horizontal loads, and absorption of stresses caused by thermal expansion of equipment. (The Ceilcote Co.)

For more data circle No. 21 on postcard, p. 193

Pipe Thermometers

Pipe thermometers, simply, easily and instantly clip to steam, water, refrigeration, gas and other pipes. They do this by means of twin, spiral spring clips supplied with each instrument. The thermome-

JONES & LAMSON
OPTICAL COMPARATORS

the man who needs
a new machine tool is
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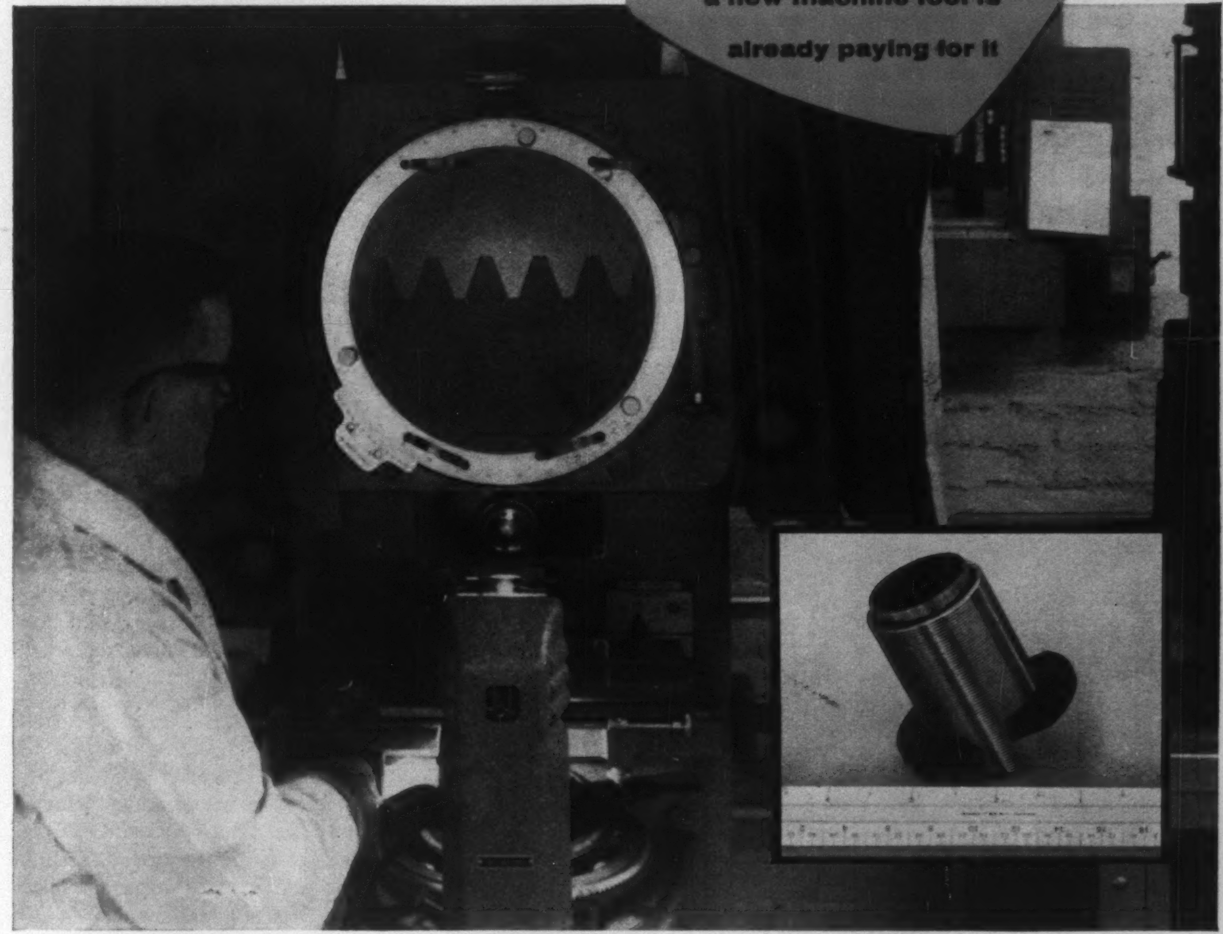


Unretouched photo (above) shows this cylindrical rack being inspected at 62.25X. Photo, courtesy of Baird-Atomic Inc., Cambridge, Mass.

4000% Increase in Inspection Efficiency through use of a J & L Optical Comparator

Baird-Atomic, Inc., Cambridge, Mass., manufacturer of scientific and research instruments needed a rapid and precise method for the quality control measurement and inspection of various components. After experimentation with various types of inspection equipment, a J & L FC–14 Optical Comparator was given a trial. It met all requirements perfectly.

The inspection of a cylindrical rack, heart of the Baird-Atomic Periscopic Sextant, used in advanced aircraft, gives an illustration of the J & L Comparator's efficiency.

The rigid quality control tolerances for this part include: tooth-to-tooth tolerance, .0002″; tooth-to-tooth error, .0003″; composite error, .0003″; pitch dia. within .0005″; concentricity within .0005″ TIR.

Adequate inspection and measurement by conventional methods proved laborious and time-consuming: inspection rate was little better than one rack per day. Now, using a J & L FC–14 Optical Comparator, average inspection rate is 42 per day, an increase of approximately 4000%!

Investigate the possibilities of J & L Comparators in *your* production set-up. Available in 12 different models, both floor and table types.

Write today for Comparator Catalog 5700. Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

changes the direction of the tool instantly for right- or left-hand tapping. An extra tripping dog changes the tool from a releasing to a nonreleasing tap holder. Independently mounted sliding jaws provide 4- and 5-point holding. They move in a vertical direction so as to take 7/16-1½ in. tap sizes. Shank size is 1½ in. (RoyEl Tools, Inc.)

For more data circle No. 13 on postcard, p. 193

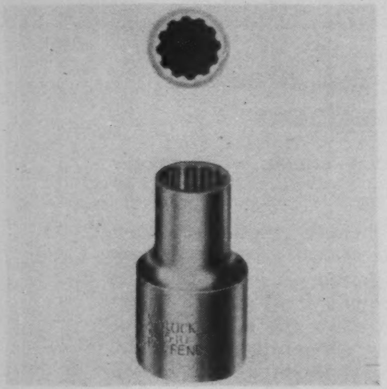
Levels Off Floor

An extension handle, on the lever valve controlling a hydraulic platform lift, enables a fork-truck operator to raise or lower himself from one split floor level to another. He can do this without leaving his seat. The platform lift is 6 x 8 ft. When in the down position, the platform descends into a floor recess so that the top is level with the surrounding floor. The unit can be powered by the plant's air line (at 100 psi). (Globe Hoist Co.)

For more data circle No. 14 on postcard, p. 193

No Socket Breakage

Costly socket breakage and wrenching failures are virtually eliminated by a new super torque socket. Lobes of the new socket grip the wrenching flats, instead of the points. This eliminates any tendency to slip or to round the points of either the nut or the socket. After being tested 100 times at more than double standard torque, the super torque socket was undamaged. The socket is made of heat-treated alloy steel. It comes in nickel and chrome-plated finishes. (Kaynar Mfg. Co., Inc.)



For more data circle No. 15 on postcard, p. 193

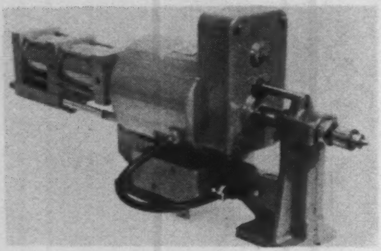
Room Cure Systems

Room temperature cure systems enable the user to follow conventional laminating and casting procedures without the necessity for curing ovens and time-consuming cure cycles. Completed tools can be fabricated at a fraction of the time and material costs of the heat cure systems. (Rezolin, Inc.)

For more data circle No. 16 on postcard, p. 193

Drills Small Holes

A 3½ in. stroke small-hole drilling unit has electric motor spindle and air feed with hydraulic control. Seven sets of timing belts and pulleys provide spindle speeds from 750-15,800 rpm. Chuck capacity is ¼ in. (The Electro Mechano Co.)



For more data circle No. 17 on postcard, p. 193

Rivets

Designed for both production manufacturing and for repair, new rivets have minimum blind side clearance. They adapt to different material thicknesses and positive hole fill, even in oversize or out-of-round holes. Rivet stems fracture cleanly and quickly. Trimming operations are eliminated. (Townsend Co.)

For more data circle No. 18 on postcard, p. 193

Aluminum Cleaner

Safe for cleaning aluminum, a cleaner can be used on any and all types of aluminum finish. The cleaner is neither acid or alkali. It is non-flammable and non-combustible. The cleaner removes grease, oil, tar, wax, waterspots, fingermarks, smog and smoke deposits. (Time Tested Products)

For more data circle No. 19 on postcard, p. 193

Transformer

Designed for the automated, processing and machinery control fields, a line of constant voltage transformers features short-circuit overload protection. It also offers rated voltage variations for both output and input functions. The units exhibit constant voltage outputs for low-voltage uses such as milling, grinding and electrical machinery controls. The transformers have an output capacity of 50 w. (Nytronics, Inc.)

REGULATED TRANSFORMER

For more data circle No. 20 on postcard, p. 193

Grouting Technique

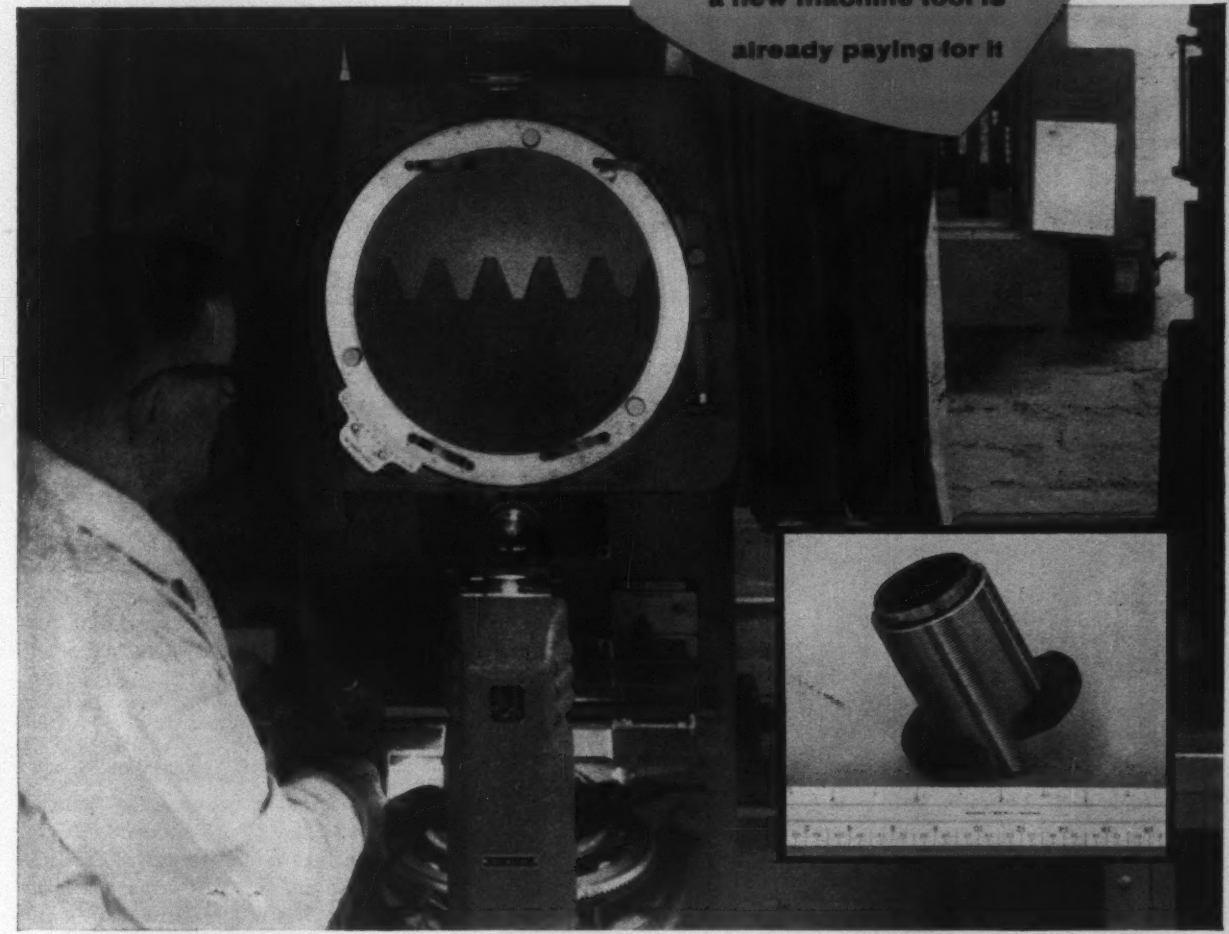
For gas compressors, a new grouting technique eliminates foundation failures and costly damage. Quick setting, a resin-based grout provides a high-strength foundation virtually impervious to oils, most acids and alkalis. It has a tensile strength of 1950 psi and a compression strength of 15,000 psi. This insures uniform support, transmittal of vertical and horizontal loads, and absorption of stresses caused by thermal expansion of equipment. (The Ceilcote Co.)

For more data circle No. 21 on postcard, p. 193

Pipe Thermometers

Pipe thermometers, simply, easily and instantly clip to steam, water, refrigeration, gas and other pipes. They do this by means of twin, spiral spring clips supplied with each instrument. The thermome-

JONES & LAMSON OPTICAL COMPARATORS



Unretouched photo (above) shows this cylindrical rack being inspected at 62.25X. Photo, courtesy of Baird-Atomic Inc., Cambridge, Mass.

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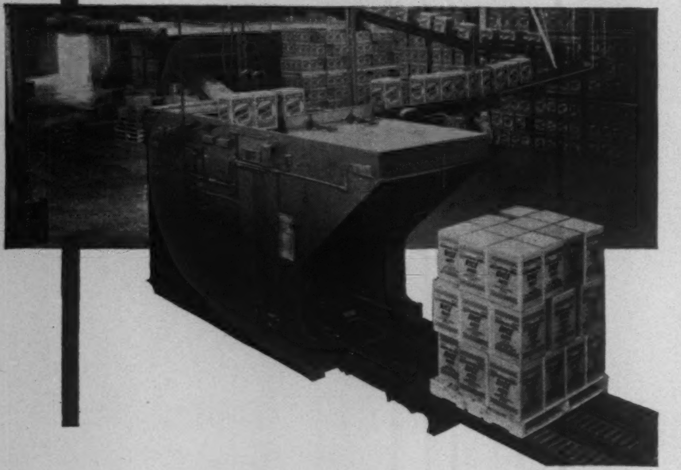
Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

MECHANIZE...
PROFIT-WISE!

...with a LAMSON AUTOMATIC
PALLET LOADER



Palletizes cartons, cases, rigid bags quickly, economically

Referred to as the "perfect link between packaging and warehousing," the LAMSON AUTOMATIC PALLET LOADER is acclaimed as a huge, money saver by leading producers of package products.

Man hours per pallet load are cut. Considerable saving occurs in the reduction of damage or breakage to cartons. Valuable men are freed for other important duties.

These reductions have been more than enough to amortize the entire cost of the LAMSON AUTOMATIC PALLET LOADER.

The introduction of the Automatic Pallet Loader was another LAMSON first in the materials handling field. A result of the ceaseless engineering vitality of LAMSON men firmly based upon 75 years of experience.

Why not bring your materials handling problems to the leaders in the field? Write LAMSON today for the name of your nearest Field Engineer. Or, simply clip this advertisement to your letterhead and mail to:

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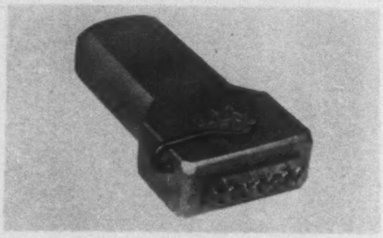
ters are precalibrated to counteract the possibility of error through heat losses of radiation or convection. They can be used for all pipes up to 3½-in. diam. (Abrax Instrument Corp.)

For more data circle No. 22 on postcard, p. 193

Holder for Marking

For heavy production straight-line marking, a holder stamps either one or two lines of characteristics. The holder has a straight shank.



It uses interchangeable slotted steel type. A shepherd pin retains the type. This steel type is used for stamping steel bars, billets and other products. (M. E. Cunningham Co.)

For more data circle No. 23 on postcard, p. 193

Directional Valve

Featured in a four-way solenoid-controlled, pilot-operated directional valve are improved performance and uprated capacity. The valve has a nominal capacity of 30 gpm. The valve gives cool, quiet operation. (Vickers Inc.)

For more data circle No. 24 on postcard, p. 193

Motor Mounts

Compact, all-steel, pre-drilled weldments mount any rerated NEMA motor (½ to 30 hp); directly to the manufacturer's shaft-mounted, flange-mounted and screw conveyor drives. (The Falk Corp.)

For more data circle No. 25 on postcard, p. 193

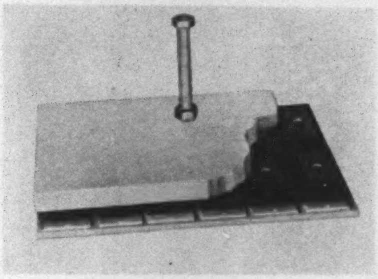
Packing Material

Composed of resilient, hollow cylindrical paper tubes, a packing material is poured to surround and securely suspend an object in a container. The protective cushioning qualities of the material are not affected by temperature or climatic conditions. A resinous coating eliminates migration of packed items during shipping and handling. The paper tubes are ¾-in. long and ¼-in. diam. (Safe-T Flo-Pak)

For more data circle No. 26 on postcard, p. 193

Machinery Mount

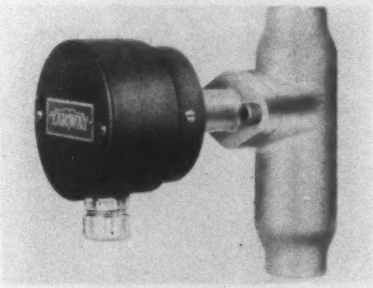
A machinery mount isolates shock and vibration from heavy, high-capacity metalforming equipment. Each mount consists of a suitable number of individual isolators to carry the required load. These isolators are secured between a common base plate and a top plate, which is drilled and tapped for a tie-down bolt. Each mount is custom designed for the particular machine and pit. The mounts cover load ratings of 16,000-128,000 lb per mount. (Barry Wright Corp.)



For more data circle No. 27 on postcard, p. 193

Sensing Device

For detection and control of process variables, a leakproof sensing device employs a patented element. The element transmits motion through a pressure-tight wall without bellows, seals or stuffing boxes. The element consists of a flexible, curved tube containing a spring wire. Deflection of the end of the tube by a variable causes rotation of the wire. This in turn may indicate the change or operate a switch. (Yarnall-Waring Co.)



For more data circle No. 28 on postcard, p. 193

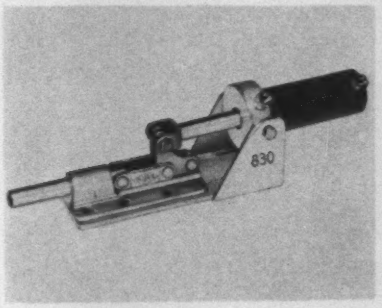
Industrial Laminate

A high-temperature, industrial laminated plastic has an asbestos woven fabric reinforcement and a modified phenolic resin binder. It features temperature resistance, high bond strength, good machinability and good dimensional stability, when exposed to moisture. It is recommended for continuous exposure up to 500°F. (Synthane Corp.)

For more data circle No. 29 on postcard, p. 193

Toggle Clamp

Air- or hydraulic-operated, a toggle clamp has a rated holding pressure of 2500 lb. The clamp is for precision push and pull operations and fast holding action. It weighs 6 lb, 6 oz. It has a clamping pressure of 300 lb. Over-all length in a forward position is 13-15/16 in.; width is 3 in. (Detroit Stamping Co.)



For more data circle No. 30 on postcard, p. 193

Expendable Reel

A fiberboard reel finds good use for packaging metal or plastic strip, rod, tubing or components served into automatic equipment on tapes. The reels come in flange diameters 4-24 in.; traverses ¾ in. and up. Advantage is obtained in a new design metal end. It engages a 3-in. ID paper tube with positive gripping at every point in the circumference. Assembly is done by hand without the use of tools or adhesive. After assembly, the flanges can't work

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WITH A
LAMSON AUTOMATIC
AIRTUBE SYSTEM

Station to station service.
Carriers have built-in memory.

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Now, you can do something about it . . . put your paper in the air via LAMSON'S AUTOMATIC AIRTUBE SYSTEM. Delivery is assured 24 hours a day in a matter of seconds . . . automatically!

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Imperial D-c Motors meet the ever-increasing demand for dependable, heavy-duty drives in nearly every industry today. Over seventy years of d-c design and application experience is behind the manufacture of these motors. Ratings from 1 through 125 hp., for constant or adjustable speeds with shunt, series or compound windings are available in all standard enclosures. When you choose *The Imperial Line* you are assured of motors that stay on the job longer ... keeping production high at lower costs. Write for bulletin or contact the sales office nearest you.

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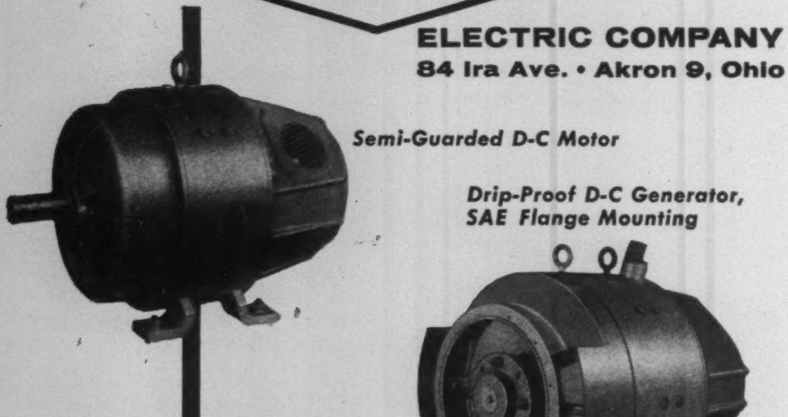

Semi-Guarded D-C Motor
Drip-Proof D-C Generator, SAE Flange Mounting
Totally-Enclosed Fan-Cooled D-C Motor
Two-Bearing Motor-Generator Set

loose or be removed without destroying the reels. (Academy Containers, Inc.)

For more data circle No. 31 on postcard, p. 193

Handles Heavy Drums

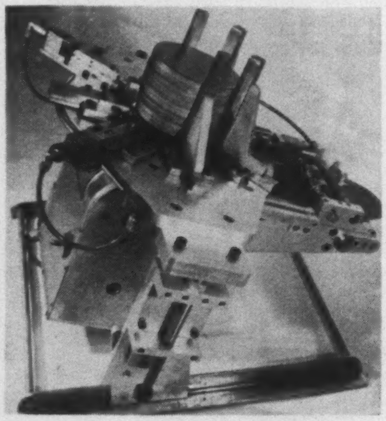
A new attachment takes the work and danger out of handling heavy drums. Known as a "drum caddy," the device drops over a drum and tightens a clamp. The operator then picks the drum up on the forks of a lift truck. The attachment is made from high-tensile steel for rugged duty. It has a weight limit of 1000 lb. (Holsclaw Bros., Inc.)

INDUSTRIAL
FINISHES

For more data circle No. 32 on postcard, p. 193

Metal-Blank Feeder

The problem of separating flat metal blanks that stick tightly together, are overcome through use of an automatic press feeder. Positive part separation occurs through both lateral and horizontal movement of the bottom blank of a top-load magazine. This separating method neither mars nor damages



DESIGN
WITH *WELDED*
TUBING

WELDED STAINLESS TUBING AND PIPE in antibiotics production

DIMENSIONALLY UNIFORM for precision fabrication
SOUND, SMOOTH SURFACES—easy to clean!

Welded tubing of tough stainless steel is a designer's dream for pharmaceutical applications. Here is where elaborate networks for transfer piping call for all of welded tubing's advantages . . . *predetermined* uniformity of wall thickness . . . consistent roundness . . . smooth, readily cleaned surfaces, inside and out.

These inherent qualities confer ease and speed in complex fabrication. Welded steel tubing is adaptable to all types of fittings. Every type of joint can be produced. Forming is precise because welded tubing is dependably accurate in dimension in every size, length after length.

Complete design data is available to you from FSTI headquarters. Ask for comprehensive Bulletin 8591 . . . and for assured application satisfaction, specify welded tubing from a quality tube producer.

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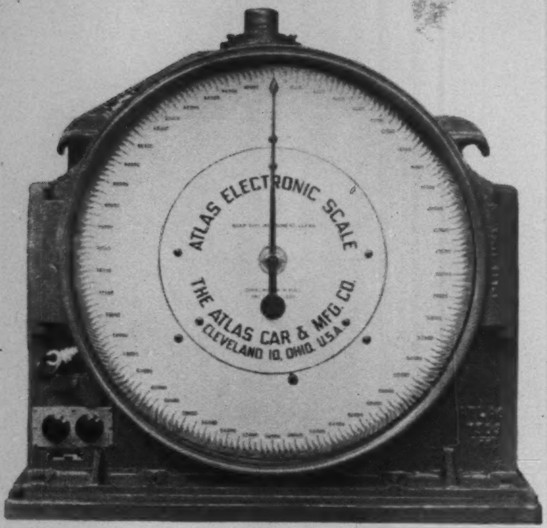
• Armco Steel Corp. • The Babcock & Wilcox Co., Tubular Products Div. • The Carpenter Steel Co., Alloy Tube Div. • Clayton Mark & Co. • Damascus Tube Co. • Jones & Laughlin Steel Corp., Electricweld Tube Div. • National Tube Div., United States Steel Corp. • Ohio Seamless Tube Div. of Copperweld Steel Co. • Republic Steel Corp., Steel and Tubes Div. • Revere Copper and Brass Inc., Rome Manufacturing Company Div. • Sawhill Tubular Products, Inc. • Southeastern Metals Co. • The Standard Tube Co. • Superior Tube Co. • Trent Tube Co., Subs. Crucible Steel Co. of America • Union Steel Corp. • Van Huffel Tube Corp. • Wall Tube & Metal Products Co.

LC-602



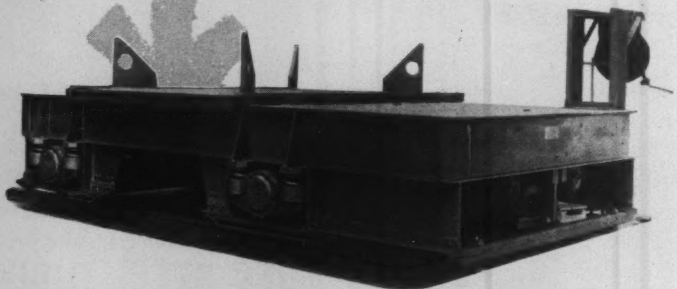
Tape Recording

Chart Recording

Atlas Builds Electronic Scales for-

Blast furnace scale cars
Coke weighing
Scrap bucket charging

This 60-ton scale car handles scrap buckets from the scrap yard to electric furnaces. For safety, the operator controls the car movement from a remote location. The electronic scale dial is mounted where the crane operator can watch it while loading the car.



60-Ton Electronic Scale Car

ATLAS CAR & MFG. CO.
1100 IVANHOE ROAD / CLEVELAND 10, OHIO

part edge or surfaces. Operating speeds, up to 150 parts per minute, are not affected. Adjustable speed conveyor maintains full control of ferrous or nonferrous blank into die nest, without bounce-back or misalignment. The separating device is standard on feeder models for parts from 1½-16 in. in diam, round or regular-shaped blanks. (Clark Industries)

For more data circle No. 33 on postcard, p. 193

Transmitter

Gas actuated, a temperature transmitter can make measurements as low as —400°F, with 1-pct accuracy. The instrument is acceptable in places where mercury is prohibited. Featuring good repeatability, this force-balance instrument comes with standard range spans of 100°, 200°, and 400°F. A bi-metallic element attached to the force beam provides compensation for case temperature effects. (Taylor Instrument Companies)

For more data circle No. 34 on postcard, p. 193

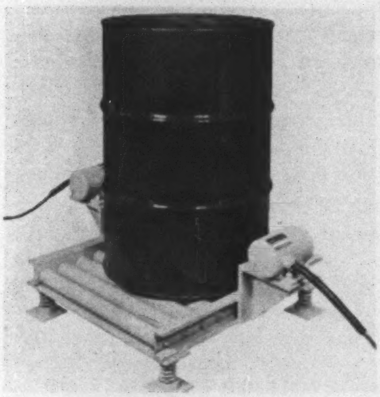
Expanding Arbor

A one-piece, machinable head expanding arbor may be used in any machine with a standard 5C spindle nose and operated by a lever-action collet closer. The arbor may be used for all cutting operations. This includes lathes, mills, grinders, drill presses and for assembly and layout work. Arbor fingers expand on a ball to deliver maximum surface engagement to the work's internal surface. Set up is simple and fast. (Hughes Engineering Co.)

For more data circle No. 35 on postcard, p. 193

Vibrating Platforms

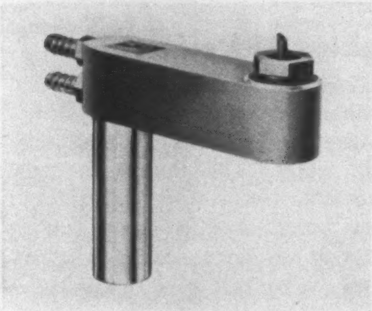
For packing containers on standard roller conveyors, a line of electric vibrating platforms may be installed in existing conveyor equipment. Electric vibrator on each side of the platform provides settling action. Because they operate on a rotating eccentric weight principle, belts and pulleys are eliminated. The electric vibrating roller platform is 24-in. square. (Cleveland Vibrator Co.)



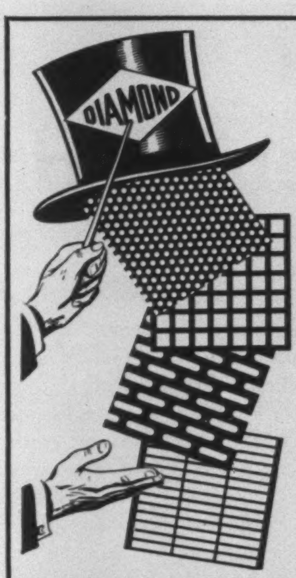
For more data circle No. 36 on postcard, p. 193

Welding Tip Holder

All-aluminum, an offset spot welding tip holder is a "slice" of an aluminum extrusion. The holders are light in weight, corrosion resistant, and are made with threaded tip adapters. Tip adapters carry the brunt of holder wear, at the tip socket, and are easily replaced. Holders come in standard 2- and 4-in. offset. (Air Reduction Sales Co.)



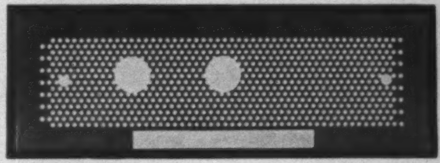
For more data circle No. 37 on postcard, p. 193



ANYTHING
IN
Perforated Metal

We're not magicians but, in nearly half a century of successful experience, have acquired such a wide range of dies, tools and other plant facilities that almost anything in the way of perforated metal sheets, plates, or parts can be produced efficiently and economically.

Our new 32-page **"Catalog 59"** illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern industrial applications. Write for a free copy and let us quote on your requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions—without charge or obligation.



Control Panel for Electric Range. We fabricate special panels or parts to any desired extent.

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For example, all Fast's Couplings are jig-drilled and jig-reamed for greater interchangeability of parts. Result: you get high-quality, smooth-running, long-lived units that are the choice of more equipment manufacturers than any other gear-type coupling.

KOPPERS COMPANY, INC., 211 Scott Street, Baltimore 3, Md.

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FAST'S COUPLINGS

Engineered Products Sold with Service

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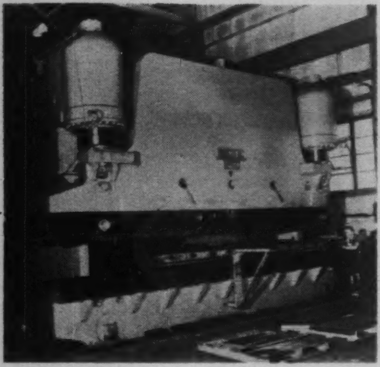
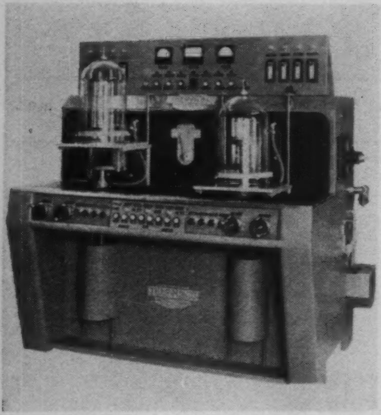


Press Brake Eliminates Jamming in Forming

In forming heavy plate, a hydraulic press brake eliminates jamming. When overload results from normal variations in thicknesses of mill stock, the hydraulic ram eases up. It does not continue to bottom of stroke. This also holds true in forming unknown alloys. The press brake discontinuing to bottom of stroke avoids jamming and permanent damage. This is unavoidable with machines required to complete each stroke. Maximum tonnage throughout the full stroke permits use of deep dies in forming 1½-in. cold-rolled and man-ten high-strength steel. Brake maintains 0.010-in. accuracy from one end of 20-ft long pieces to the other. Pieces can be formed by eye with minimum set up. (Pacific Industrial Mfg. Co.)

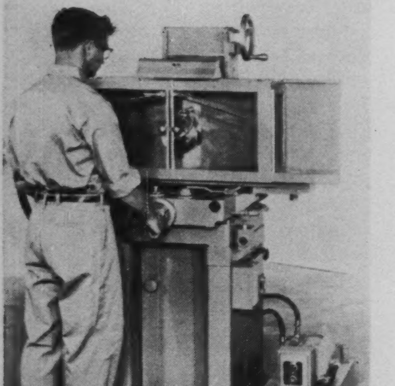
For more data circle No. 40 on postcard, p. 193



Unit and Method Put Exotic Metals on Production

For use in lab work or small production runs, as on exotic metals, a two-position work station permits lab studies of brazing efficiencies. This work station is built together with a high-frequency induction heater. The unit allows these studies with various atmospheric conditions. It also permits studies of the actions of various fluxes and brazing materials. Each position of the work station can handle four gas inputs—hydrogen, nitrogen, cracked ammonia and forming gas. Almost any testing or lab work can be done with little changeover time. Solenoid valves control individual switching of the flow of all gases. Piping valves permit individual flow adjustment. Four flow meters monitor the rate of flow. Two extra output terminals in the right hand side of the work station allow tapping the output of the second station. (Induction Heating Corp.)

For more data circle No. 41 on postcard, p. 193



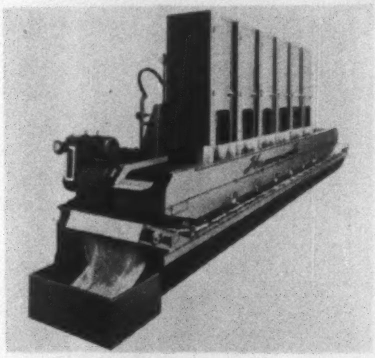
Machine Slices Semi-Conductor Materials

A slicing machine gives high production in the slicing of semiconductor materials. The machine cuts silicon, germanium, quartz, ceramics, ferrites and carbides. Adequate size and well-sealed guards are a distinguishing feature of the unit. Some of the machine's other features are: precision spindles and automatic lubrication, drive and coolant systems. In the slicing of semi-conductors, the application control of the coolant is of utmost importance. This makes possible maximum accuracy. In this machine, the coolant system has individual needle valves for each side of the cutter. This insures an equal amount of coolant for both sides of the cutter. A filter in the coolant system reclaims the swarf from cutting. A flat belt drive and precision spindle drive very thin diamond cutting wheels. The cutting machine has a 6- x 12-in. table area, a 12½-in. table traverse and a 6-in. cross feed. The cross feed is manually operated. (The DoAll Co.)

For more data circle No. 42 on postcard, p. 193

Flat Finishers

Flat finishers feature automatic air-actuated belt tracking and oscillation. After the tracking has been set, it requires no further attention from the operator until a new belt is installed. Other features of the finishers include automatic air tensioning and variable-speed conveyor. The finishers are high-production machines for the wet abrasive belt grinding, polishing, and deburring of flat work. Such flat work may include sheets, bars, strips, stampings, plates and extrusions. (Hammond Machinery Builders, Inc.)



For more data circle No. 43 on postcard, p. 193

Undercar Heaters

An electric radiant heater quickly removes ice, snow and frozen residual material from railway hopper cars before loading. Used in pairs, the heaters are placed between the rails so as to be directly under the cars. Overall dimensions of the heater are 44-in. long x 22-in. wide. (Radcor, Inc.)

For more data circle No. 44 on postard, p. 193

Air Compressors

Portable, tank-mounted air compressors have constant-pressure, suction valve unloaders. These unloaders can be quickly set for any pressure from 50-15 lb. Designed for heavy-duty projects such as air-tool operation, all models feature heavy-gage 3 or 10 gallon tanks. Other features are: heavy-duty twin-cylinder compressors; extra-large rubber-tire wheels. The series consists of three models: a 1-hp electric; a 1½-hp electric; and a model

Killing blow! It takes only minutes for fire to burn your business to a crisp. Guard against the danger of a crippling flammable-liquid fire (as in the spray booth above) with a *fully automatic* Kidde carbon dioxide extinguishing system. Approved by U.L. and F.M., Kidde systems smother flammable-liquid and electrical fires in seconds, leave no mess, turn off power and sound alarms... get you back in production fast. Kidde's 35 years of experience can help you protect any hazard. Write Kidde today and find out how.

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.
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Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

with a 3-hp gasoline engine. (Saylor-Beall Mfg. Co.)

For more data circle No. 45 on postcard, p. 193

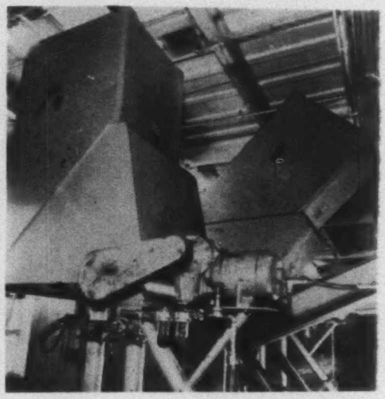
Measures Shaft Angle

Two-speed, precision servo systems measure the angular position of remote shafts. They do this with a high degree of accuracy. The systems provide an output in digital form. This form is suitable for entry, via storage and translation circuitry, to recording devices. The systems provide a range of 000.-001° to 359.999°, resolution and repeatability of 000.001°. Root mean square accuracy is ±5 seconds of arc. Absolute accuracy is ±15 seconds. (Datex Corp.)

For more data circle No. 46 on postcard, p. 193

Allows Bin Transfer

A tote tilt allows the removal of a baffle-equipped tote bin, after partial discharge of contents. The discharge mechanism comes with either a screw conveyor or gravity discharge hopper. The tilt is particularly adapted for handling carbon blacks, since it allows immediate change of blacks after a production run. However, the tilt is equally as versatile for any bulk material.

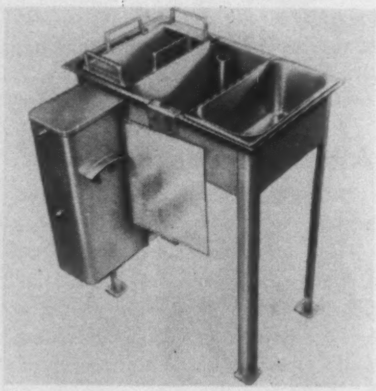


Should a bin be partially empty at the end of a production run, the tilt simply is lowered back to a level position. The product flows out beneath the baffle within the bin to its natural angle of repose. It holds the remainder in the bin. (Tote System, Inc.)

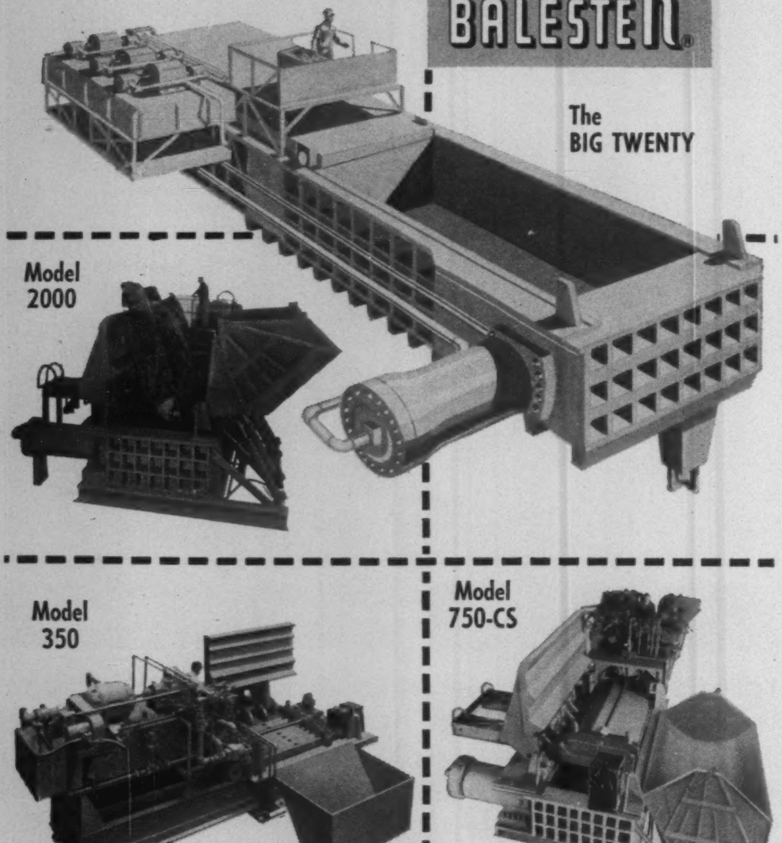
For more data circle No. 47 on postcard, p. 193

Metal Parts Cleaner

Parts of simple or unusual shape are cleaned most efficiently by a metal-parts cleaner. Stainless steel, brass, aluminum, carbon steel,



nickel and nickel alloys and other materials can be finished to a bright surface. The cleaner removes encrusted carbon, weld oxides, brazing flux, varnish and paint. It contains



America's Most Complete Line of High-Speed Baling Presses

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Cut scrap-metal baling time and costs with a high-speed, low-investment DEMPSTER-BALESTER. You buy the power and capacity you need . . . plus dependability . . . when you choose from the many models in America's most complete line. Write for free catalog on the new 750-CS.

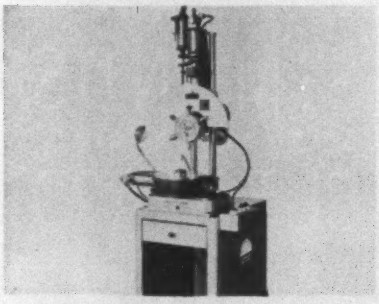
DEMPSTER BROTHERS KNOXVILLE 17, TENN. DEPT. IA-11
Inc.

no moving parts or electronic tubes. Cleaning is performed with company cleaning solutions. (Pall Corp.)

For more data circle No. 48 on postcard, p. 193

Turret Drill

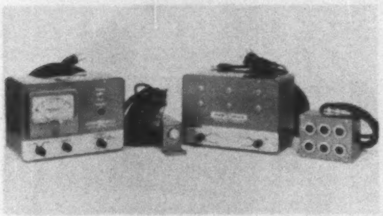
Providing automatic power feed and turret indexing, a six-spindle turret drill sets the pace rather than the operator. It increases production of operations requiring precision drilling, reaming, tapping. Individual depth stops for each spindle permit rapid traverse to the work and limit the depth of cut. (Burgmaster Corp.)



For more data circle No. 49 on postcard, p. 193

Protects Equipment

An electronic device protects equipment and processes against damage from excessive vibration. It is sensitive to vibration as small as two millionths of an inch amplitude. A resonance-type vibration monitor, it flashes a signal or stops the machine if safe limits of vibration amplitude are exceeded. With an accessory plug-in attachment, the device becomes a portable balancer. It is used in correcting the conditions creating the vibration. (Stewart-Warner Corp.)



For more data circle No. 50 on postcard, p. 193

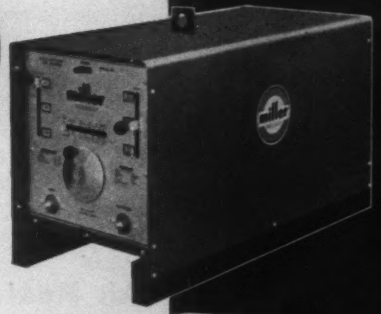
Impulse Generators

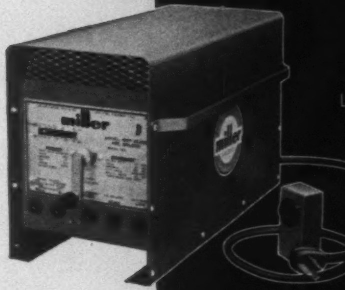
High-voltage impulse generators come in models for 700, 1400, 2100, or 3500 kv. They're for use in testing cables, insulating materials, electrical equipment and lightning-protection systems. The design of the units uses a number of impulse capacitors. The capacitors are charged via suitable resistors up to a maximum voltage of 175 kv when connected in parallel. By means of spark gaps, the capacitors are then suddenly connected in series. The test object then receives a high voltage which is about equal to the product of the number of capacitors and the charging voltage. (Philips Electronic Instruments)

For more data circle No. 51 on postcard, p. 193

Safety Control System

Non-electric, a self-powered engine safety control system protects all types of engine installations. It protects them against dangerous overspeed, temperature, and pressure conditions. A small captive charge of compressed air operates





miller WELDERS

AND BOTH MILLERS. . . *Through and Through*

BIG TWIN combination ac-dc welders work from single phase service — deliver new convenience and economy. Two a-c amperage ranges of 20-125 and 60-290 plus two d-c ranges of 18-100 and 65-290 amps master nearly every welding requirement from light gauge metal to structural pieces. Movable shunt type transformer affords infinite current adjustments. Other features include: Horizontal design for easy stacking; weather-resistant construction and Class B insulation; Miller-built semi-metallic rectifier for best d-c welding; high open circuit voltages and new weld stabilizer. This is THE all-time, all-around welder!

LITTLE TWIN ac-dc combination welder has two a-c amperage ranges of 20-115 and 60-180 plus one d-c range of 40-150. Operating from single phase service, this Miller model incorporates many design and construction features usually found only in large industrial types. These include really rugged construction, forced air cooling, new Miller semi-metallic rectifier, movable shunt type current control, new weld stabilizer and open circuit voltage in abundance. Power factor correction is available on both models. Complete specifications on either model will be sent promptly upon request.

miller ELECTRIC MANUFACTURING COMPANY, INC. • APPLETON, WISCONSIN

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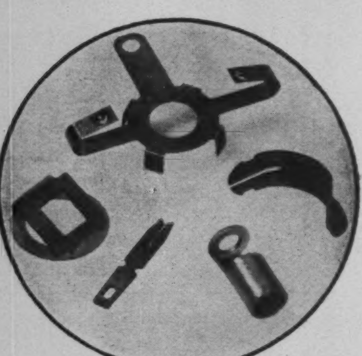
MORE BOUNCE
TO THE MILLIGRAM



Somers THIN STRIP

PHOSPHOR
BRONZE

From .000125" thin to .010", Somers Thinstrip phosphor bronze is produced by a unique high-speed annealing process which provides a uniform *fine grain* structure. Thus, spring temper metal is produced with elongation up to five times that of coarse grain methods, making possible the forming of much more intricate parts for many instrument and electro-mechanical applications. And Somers' close control of grain size guarantees prolonged fatigue resistance unattainable through ordinary methods.
Whatever your Thinstrip problems, in copper, copper alloys and stainless steel from .010" down and nickel and nickel alloys from .020" down, write for the Somers confidential data blank. No obligation, of course.

FOR EXACTING STANDARDS ONLY

Somers THIN STRIP

Somers Brass Company, Inc.
102 BALDWIN AVE., WATERBURY, CONN.

the system. The control can put into operation almost any type of pilot-operated valve, switch, warning or other device when the captive air charge is dumped to atmosphere by sensing units. (California Controls Co.)

For more data circle No. 52 on postcard, p. 193

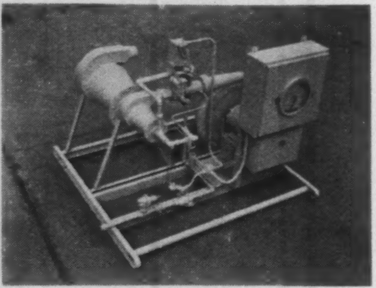
Heavy-Duty Keyseater

Featuring air-powered, automatic feed, a precision keyseater cuts keyways from ⅛- to 2½-in. wide, and up to 22-in. long in parts. A double solenoid-operated four-way pneumatic valve and air-cylinder hook up, provides automatic work table back-off and feed functions. A form tool machines the keyways on the down stroke. The table also tilts to machine tapered keyways. (Star Cutter Co.)

For more data circle No. 53 on postcard, p. 193

Air Heater

Good high-combustion efficiency and absence of impurities are principal features of a direct-fired air heater. Basic uses of the unit include: heating of process air for fluidized bed dryers or spray dryers, direct heating of furnaces, indirect heating of process fluids. (Black, Sivalls & Bryson, Inc.)



For more data circle No. 54 on postcard, p. 193

Increases Feeds

Diversified pressure agents in a new machining and grinding concentrate increase both feeds and speeds as much as 30 pct. At the same time, it improves tool life and produces better parts finish of ferrous alloys. The concentrate is recommended as a fortifying agent

Fast Delivery

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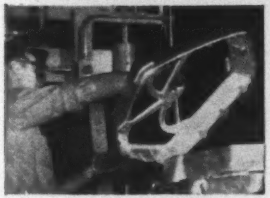
DENISON HydrOILics

JOHNSON MOTORS uses DENISON Multipress to solve die-cast...

TRIM COSTS

FOUR STURDY COLUMNS *accurately guide the Multipress platen and the top half of the trim die. Hydraulic power unit is mounted overhead to minimize floor space and for easy access to the Multipress bed. Operation at Johnson Motors Company, Div. Outboard Marine Corp., Waukegan, Ill.*



SURPLUS MATERIAL *from die-casting operation is accurately, economically trimmed with Denison Multipress from these large aluminum outboard motor castings without damage.*

TRIMMING COSTS had to be considered carefully by Johnson Motors in tooling up for their powerful new 40-hp and 75-hp Sea-horse® motors. Improper trimming would mean scrapping large aluminum castings—seriously boosting production costs.

The Denison 15-ton, Four-Column Platen Multipress—designed after extensive investigation of industry's needs for an efficient die-cast trimming press—was the logical solution. Multipress affords rigid platen guidance . . . adjustable speed controls to suit individual operator skills . . . and the precise, cushioned application of hydraulic pressure to assure *die-cast trimming without costly rejects.*

This Four-Column Platen Multipress filled other Johnson trimming press needs, too—large die capacity . . . four-side press accessibility for conveyor adaptation.

An endless range of production jobs are done better . . . for less with Denison hydraulic Multipress—capacities from one to 100-tons. Your Denison Production Specialist can show *you* how with a **M**ultipress **A**nalysis **P**rogram made in your plant now—at no cost, no obligation. It's the first step to **MAP** new savings in *your* production operations.

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American Brake Shoe Company
1242 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS

for cutting, grinding, tapping and drawing oils. (Baker/Gubbins Co.)

For more data circle No. 55 on postcard, p. 193

Weight Inspection

A weight inspection tool continuously weighs and sense weighs variations from a preset standard. Products weighing up to 500 lb can be checkweighed with an accuracy of ±¼ oz. The unit can also be set up to perform a number of different operations when an over-under weight item is detected. (Thayer Scale Corp.)

For more data circle No. 56 on postcard, p. 193

Removes Rusty Nuts

A new tool called a "nut buster" splits and removes rusty or frozen nuts. It can do this without damage to threads or bolts. The whole operation is a matter of seconds. The cutter is of high quality tool steel. (Borroughs Tool & Equipment Corp.)

For more data circle No. 57 on postcard, p. 193

Hand Welder

Light in weight, a hand welder and tacker tacks and hand welds thermoplastics. The unit comes with a 320-w heating element, one round tip, one tacker tip and a needle valve for air-flow control. The welder is made of stainless steel throughout, with 16 ft of neoprene air hose attached. The unit can be plugged into any 115-v ac outlet. (Kamlar Products Co.)

For more data circle No. 58 on postcard, p. 193

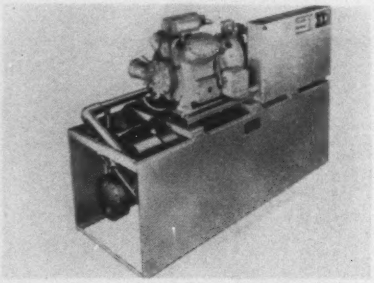
Seals Concrete

A colorless liquid seals, toughens, hardens and eliminates dusting of concrete surfaces. It can be applied over new or old concrete surfaces. Containing no vegetable oil, the liquid will not cause saponification on newly-poured concrete. The liquid seal resists damage from water, oils and acids. (The Monroe Co., Inc.)

For more data circle No. 59 on postcard, p. 193

Liquid Chillers

For air-conditioning or industrial cooling applications, a line of hermetic-packaged liquid chillers comes in net rated capacities up to 67.1 tons. The package design is complete, requiring only a minimum of water piping and electrical connections to be made in the field. With no shaft seal, maintenance problems and refrigerant leakage are greatly reduced. (American Radiator & Standard Sanitary Corp.)



For more data circle No. 60 on postcard, p. 193

Measures Horsepower

A meter measures horsepower directly, with no modification of the existing shaft. Shaft torsional deflection and rotational speed are measured magnetically. They are electronically multiplied to give horsepower. Horsepower plus torque and revolutions per minute are displayed on self-contained meters. The horsepower meter is completely transistorized to supply

ADVANCE TerriCord
HEAT & FLAME RESISTANT
WELDER'S GLOVES

SERVES THE SAME PURPOSE AS LEATHER GLOVES COSTING THREE TIMES AS MUCH!

Hundreds of very closely knitted loops per square inch prolong wear . . . offer flame and heat protection . . . increase manual dexterity. Perspiration will not harden or stiffen it.

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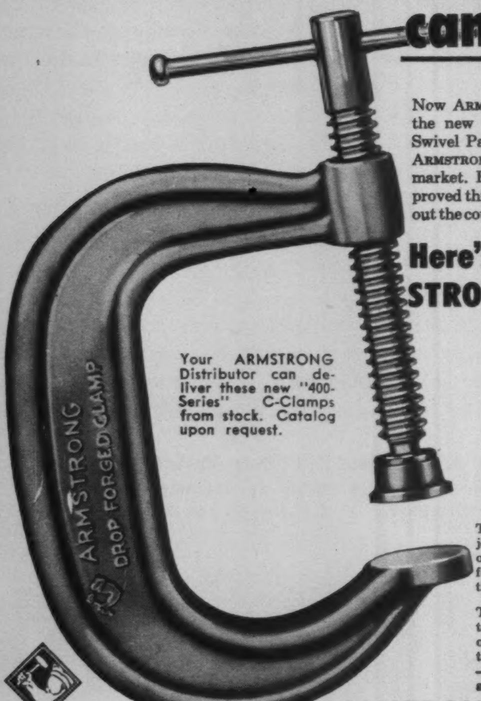
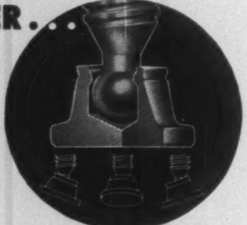
PLANTS in . . .
DETROIT, CHICAGO, TOLEDO • ROME, GEORGIA



New ARMSTRONG Swivel Pad can't come off

Now ARMSTRONG deep throat "C" Clamps have the new (Pat. apd. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

Here's Why it's STRONGER . . .

Your ARMSTRONG Distributor can deliver these new "400-Series" C-Clamps from stock. Catalog upon request.

The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer—yet the pad is free to swivel through an arc of approximately 40°.

ARMSTRONG BROS. TOOL CO.
5209 W. Armstrong Ave. • Chicago 46, Illinois

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It will pay YOU

...to use resin-bonded belts

Here are the simple facts of the matter: Behr-Manning resin-bonded abrasive belts are faster cutting. Loading or shedding is at a minimum. Naturally, therefore, they last longer than glue-bond belts, and completely justify their slightly higher initial price by the production savings you enjoy.

There are two principal types of Behr-Manning resin-bonded abrasive belts:

RESINALL® . . . an all resin-bonded aggressive belt of strong X-weight cloth, for maximum heat resistance in most all rough and intermediate grinding operations.

RESINIZED® . . . a resin-over-glue belt of good heat resistance, in strong X-weight for flat polishing, and in flexible J-weight for contour polishing.

Prove to your own satisfaction how resin-bonded belts will save you time and money. Ask for an in-plant demonstration. Write Dept. IA-11, Behr-Manning Co., Troy, N. Y., a division of Norton Company.

BEAR BRAND
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WYCKOFF
COLD FINISHED STEEL
BARS

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Steel
ORDNANCE
AIRCRAFT
AGRICULTURAL
ELECTRICAL
MACHINE TOOLS

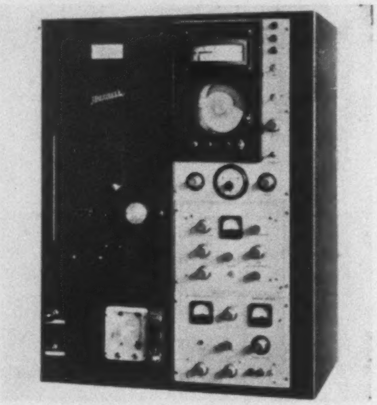
stable, accurate systems outputs. (Sierra Research Corp.)
For more data circle No. 61 on postcard, p. 193

Clean Room Units

Pre-fabricated air-conditioning units answer a need for packaged units that will deliver guaranteed performance to rigid specifications. These specifications include temperature, relative humidity and dust control. The units require only connection to source of power and drain. Tonnage ratings are in the 2-7½ ton range. Compressor-condenser sections are of the unloading type. They operate continuously without icing. (Agner-Higgins, Inc.)
For more data circle No. 62 on postcard, p. 193

Ionizing Instrument

For gas chromatography, an instrument uses ionization detection by thermionic emission. This is the only method that analyzes both organic and inorganic compounds; as well as fixed or permanent gases. The ionization detector is completely safe. A gas sampler and flowmeter are built-in. (Burrell Corp.)



For more data circle No. 63 on postcard, p. 193

Milling Machine

For production milling rates as high as 6000 parts per hour, an automatic milling machine maintains tolerances of ±0.001 in. The chain drive continuously moves as the parts to be milled are inserted

Mid-States Steel & Wire Co.
Crawfordville, Indiana

Mid-States Diversifies Product Line...

Consolidates Lubricant Inventory!

The past twenty years have seen Mid-States Steel & Wire Company greatly diversify their product line while they simplified their lubricants inventory. Today you would find at Mid-States, banks of nail-making machines pouring out over 35 tons of nails every day . . . new fence-making machines . . . machines producing hardware cloth, ornamental wire, baler wire, wire lath, welded fabric, window guards. The list could go on and on.

While the number of products has grown, Mid-States, with the cooperation of Cities Service Lubrication Engineer "Ken" Mosher, have constantly studied their lubrication requirements and have reduced the number of individual lubricants. Pacemaker oil serves as a hydraulic oil and also as a lubricant on many machines. Cities Service multi-purpose Trojan H grease does triple duty throughout the plant. Cutting oils and other lubricants are held to a minimum by selecting a quality lubricant to serve several applications. Reducing the number of lubricants saves valuable warehouse space and cuts the chance of error in servicing machines.

Call your local Cities Service office for a Lubrication Engineer to show you how you can reduce your lubricant inventory. Or for full information write: Cities Service Oil Company, Sixty Wall Tower, N.Y. 5, N.Y.

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GEAR PERFORMANCE to match the speed, size, and power of modern machines is a Fairfield specialty. This is possible because Fairfield is a leader in utilizing the most advanced methods, machines, and techniques for producing better gears. By keeping apace with modern engineering progress, Fairfield renders an invaluable service to many of the nation's leading machinery builders: *"Gear Performance Made to Order!"*

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Gears and Differentials *Made to Order for:*

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MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

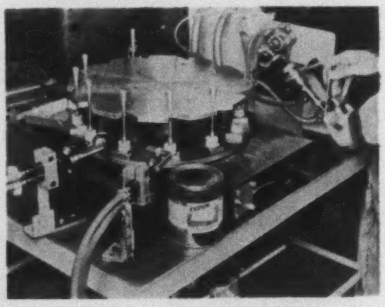
by hand or automatically hopper fed. The carrying bases continue beyond the hardened ways allowing internal springs to open the jaw cavities and release the machined parts. (The Baird Machine Co.)
For more data circle No. 64 on postcard, p. 193

Press Welder

Equipped with a special four-station, dial-type upper die holder, a press-type projection welder allows selecting four different weld forces. This is done through a four-button push-button station. The dial-type upper head automatically moves the die selected to the weld station. The proper air pressure for this particular station will also be selected automatically, as well as the particular heat setting on the control panel. After all of this is selected, the operator then manually positions the tank or part and initiates the machine. (The Federal Machine & Welder Co.)
For more data circle No. 65 on postcard, p. 193

Soldering

A simple indexing machine offers semi-automation soldering, with an increase in production rate. The operator positions the parts under the nozzle of the solder applicator. The part receives a metered amount of solder paste (solder and flux combined). The joint to be soldered receives a second metered amount of paste. It is then loaded into the special ceramic fixture and positioned in a slot spring loaded to hold the part. As the table indexes, the joint passes in front of a preheat air gas torch, then a final heat

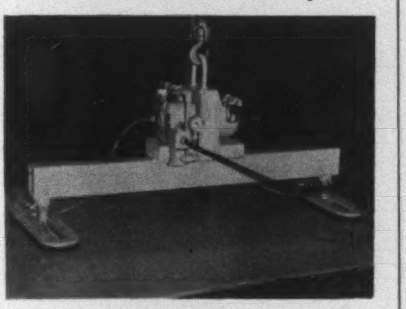


torch. It then air cools and is automatically ejected onto a slide. (Fusion Engineering)

For more data circle No. 66 on postcard, p. 193

Vacuum Hoist

A vacuum hoist consists of two 14-in. oval pads. This attachment allows a single operator to lift, transfer, lower, stack or position any relatively non-porous material. A compact unit, it is constructed of welded steel. It is entirely self-contained with a 110-v, single phase, 60-cycle power pack. A push-button pendent control operates the attachment. The two oval pads are completely adjustable along the beam. The hoist attachment has a total capacity of 1600 lb. (The Siegler Corp.)



For more data circle No. 67 on postcard, p. 193

Molding Machine

Fully automatic, an injection molding machine has a printed circuit electrical system. It features plug-in relays, limit switches and timers. The open-frame base construction permits a free drop of finished parts into a container or onto a conveyor system. Clamp stroke is adjustable, 5-12 in. It offers a versatile range of molded parts. The 2-oz machine has a plasticizing capacity of 60 lb. (Moslo Machinery Co.)

For more data circle No. 68 on postcard, p. 193

Load Simulator

A dynamic-load simulation system applies a programmed load or stroke. It does this to such items as engine mounts and shock mounts; also to other items having force vs. displacement, or force vs. velocity characteristics requiring test.

What makes the first gear-type coupling still first choice?

COUPLING A BILLION HORSEPOWER

Check design . . . and you'll find Fast's Couplings (the original gear-type couplings) are superbly engineered, ruggedly built, smoothly running units designed to outlast the machines they connect.

Check completeness of line . . . and you'll find Fast's Couplings come in a complete range of sizes and types for shafts from ½" to 32" and larger.

Check service . . . and you'll find Fast's Couplings are backed by expert help from experienced field engineers . . . while outstanding stock facilities throughout the country insure speedy delivery of your coupling orders.

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Engineered Products Sold with Service

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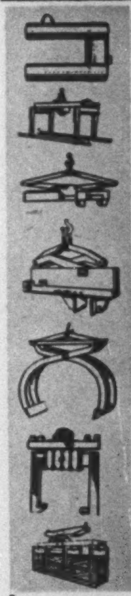

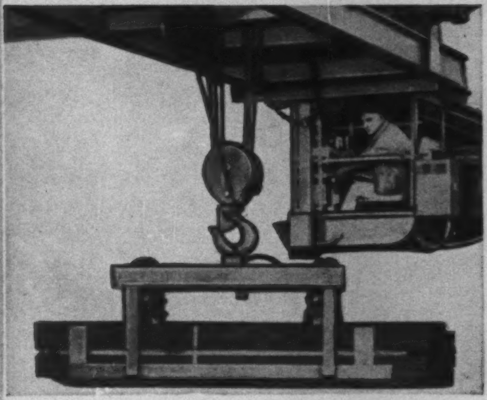

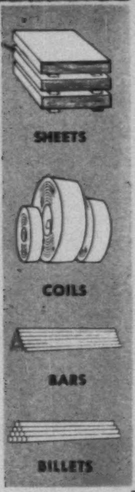

☐ SHEETS
☐ COILS
☐ BARS
☐ BILLETS

CHECK ITEMS YOU HANDLE AND SEND FOR LITERATURE AND MORE INFORMATION

One-Man Operation — SAVE TIME and LABOR!

Five tons of sheet steel are quickly picked up from trucks with a cab-controlled, motor-operated Mansaver and transported by tramrail. Mansavers are also available in manual, semi-automatic and fully-automatic styles. Unloading time has been reduced from 3½ hours to 20 minutes.
Ask our District Representative into your plant to study your handling problem for presentation for our solution.

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Also Manufactured in England and in France

The basic control console is a cabinet containing the controls and instruments to perform dynamic loading and stroking on a variety of load equipment. It also provides control signals for any of the company's single-stage servo valves. The control is designed so that either position or load may be controlled, and both position and load may be used. (Pegasus Laboratories Inc.)

For more data circle No. 69 on postcard, p. 193

Processes Wide Strip

A 60-in. wide warehouse-type slitter, for steel or aluminum strip, is designed for minimum maintenance and operator skill. The sturdy, welded steel-slitter base supports the main housing and front housing which carry the arbors. Front housing pulls out for changing knives and spacers. Entry pinch rolls are furnished for a feed-up speed of about 50 fpm. (Steel Equipment Co.)

For more data circle No. 70 on postcard, p. 193

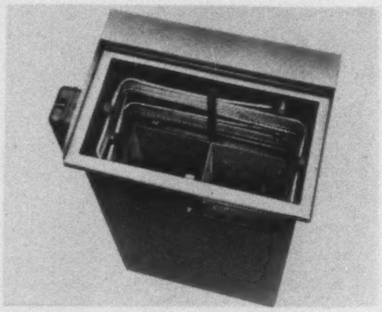
Gage Calibration

Effortless calibration of pressure gages and transducers is possible with a line of pressure balances. The new balances give pin-point pressure values up to 100,000 psi, with accuracies up to 1/20th of 1 pct. Dials of the gages being calibrated can then be set to these very accurate values to insure correct readings. (American Instrument Co., Inc.)

For more data circle No. 71 on postcard, p. 193

Spotless Dryer

Specially - designed equipment, with a special drying solvent, provides rapid, thorough, stain-free drying of water-wet metal parts. The process is suitable for almost any article unaffected by trichlorethylene, including glass, ceramics and metals. It can be used for intricately-shaped parts with cracks and crevices; also stampings, extrusions, castings, tubes, wire and strip. The solvent is ideal for spot-free drying after electroplating, phosphating, electropolishing, acid pickling and bright dipping. (Phillips Mfg. Co., Inc.)



For more data circle No. 72 on postcard, p. 193

Magnet Systems

Versatile laboratory magnet systems are ideal for a variety of applications. Individually - adjustable and replaceable pole and pole faces

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CAP SCREWS • NUTS
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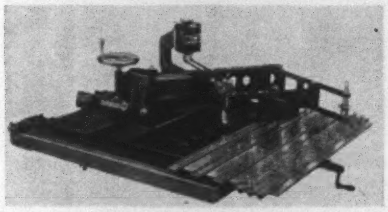
allow maximum variation of the magnetic field configuration. Coupled with a continuously variable output power supply, these systems provide a most flexible basic research tool. (M H D Research, Inc.)

For more data circle No. 73 on postcard, p. 193

Engraving Machine

For marking extra plates or oversized electronic panels, an engraving machine accepts sizes of 19 in. by any length. The cutter spindle covers an area of 19⅛ x 6 in. in one setting. The pantograph is adjustable from 2:1 to 8:1 ratios. A powerful ball bearing assembly takes a ¼-in. diam cutting tool. The machine is equipped with an automatic depth regulator for engraving on irregular surfaces. (New Hermes Engraving Machine Corp.)



For more data circle No. 74 on postcard, p. 193

Welding Goggles

Welding goggles provide protection against a wide range of eye hazards. The line of goggles is recommended for use in gas-welding, cutting, burning and furnace operations. Other goggles in the line are recommended for wear over spectacles during similar operations. Both types of sturdy goggles have ventilated side-shields which keep out stray light and metal splashes. They have adequate ventilation to prevent lens fogging. (Air Reduction Co., Inc.)

For more data circle No. 75 on postcard, p. 193

Mobile Belt Loader

With a continuous running belt, a high-tonnage mobile belt loader is capable of pouring 3500 tons of material per hour into hauling units. The system has an internal hydraulically-operated gate. The positive hydraulic cut-off of the discharge gate and feeder prevents dribbling or spilling of materials between loading discharges. The continuous running belt eliminates shear and starting load. The fifth wheel pin under the discharge end permits hook-up and movement by truck, without crane lift or tractor pullout. (Western Conveyor Co.)

For more data circle No. 76 on postcard, p. 193

Power Units

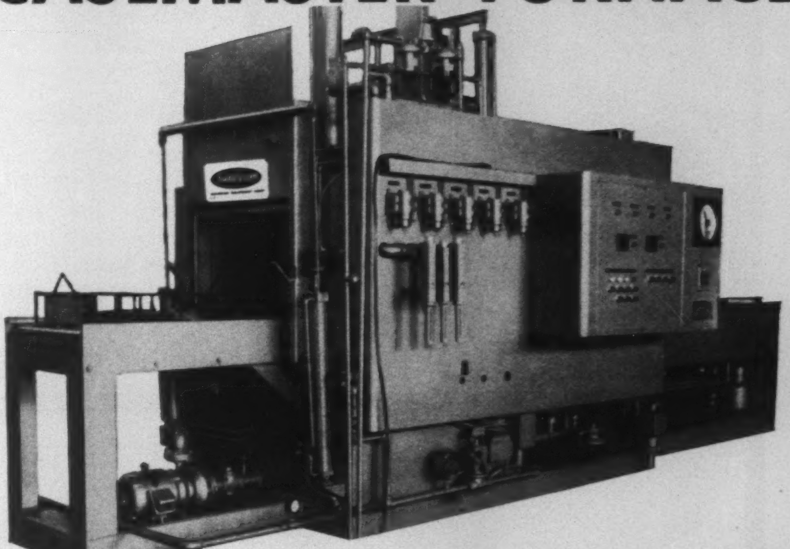
Hydraulic power units range from ½-10 hp. They also range from 1.7-13 gpm at 1250 psi and 5000 psi. The power units are portable, or semi-portable. Weight ranges from 20-770 lb. Some are hand operated, others are foot operated. Most units can be operated by solenoid remote controls. (W. A. Whitney Mfg.)

For more data circle No. 77 on postcard, p. 193

Second Operation Unit

Setting the standards for fine precision work on a production

The NEW Sunbeam
CASEMASTER FURNACE



for continuous carbonitriding, carburizing, carbon restoration, normalizing, annealing and hardening

Heats More Work Automatically At Less Cost!

Completely automatic and accurate, this new Casemaster furnace has all of the cost saving advantages you need to produce more work with better quality.

- Maximum loading up to 1500 pounds of work in one load.
- Automatic operation makes loading easy, fast and safe.
- Flexibility allows for processing a wide variety of products over a broad temperature range.
- Fewer rejects from thorough penetration of heat and atmosphere.
- One furnace operator can handle many furnaces.
- Sunbeam Casemaster furnaces are completely assembled and tested before shipment.

Bulletin SEC-9 gives complete data on all sizes of the Sunbeam Casemaster. Write for your copy, today.

Sunbeam *the best industrial furnaces made*
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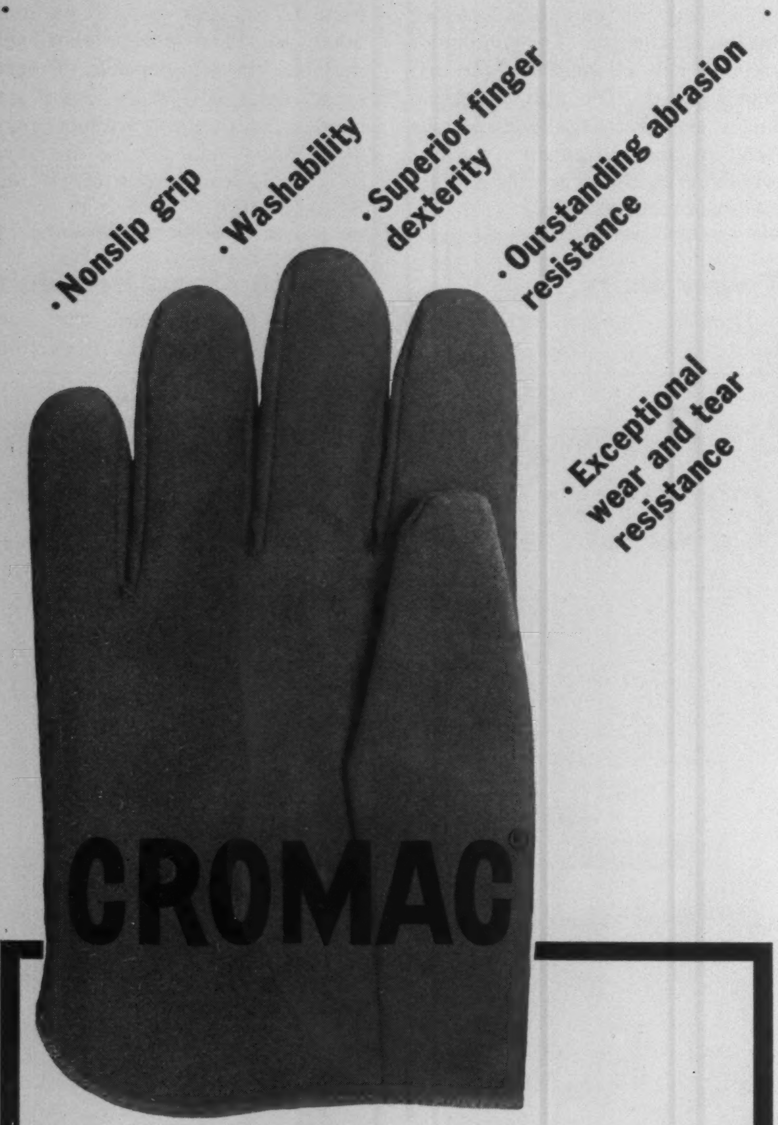
200 Mercer Street Meadville, Pa.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• Superior finger dexterity
• Outstanding abrasion resistance
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FREE SAMPLE PAIR will convince you . . . Cromac gloves by Jomac are all we say they are and more. Write Department K, Jomac Inc., Philadelphia 38, Pa.

JOMAC

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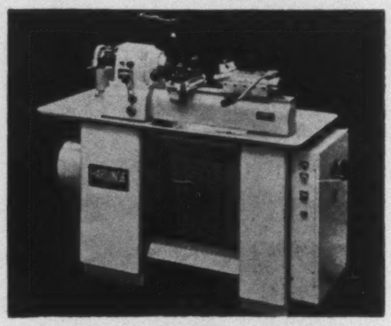
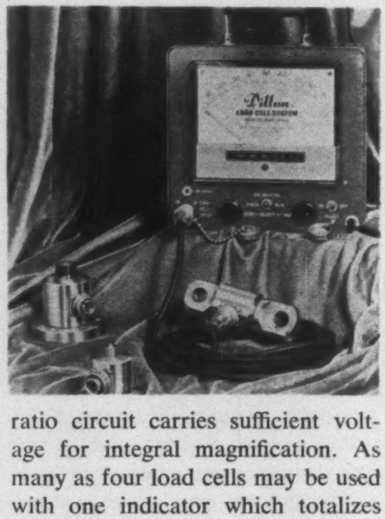
basis, a second operation machine provides 1-1/16 in. round collet capacity through the spindle. The machine also has step chuck capacity to 6 in. Spindle speeds go up to 4000 rpm. The spindle takes a full range of standard tooling: the company's collets, step chucks, jaw chucks and face plates. The double tool cross slide takes standard tooling accessories for forming, cutting off, facing and taper turning. (Hardinge Bros., Inc.)



For more data circle No. 78 on postcard, p. 193

Remote Force Reading

A remote, indicating load cell system permits instant, direct readings of forces, in pounds. It can do this at distances over 1000 ft from the actual cell. The load cell system uses an exclusive differential transformer principle. A special inverse-ratio circuit carries sufficient voltage for integral magnification. As many as four load cells may be used with one indicator which totalizes individual loads. Applications are found wherever site proximity is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inconvenient, dangerous, confined or outside of naked-eye range. (W. C. Dillon & Co., Inc.)

For more data circle No. 79 on postcard, p. 193

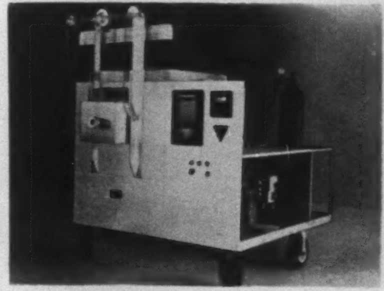
Heavy-Duty Drill

Permitting a wide variety of operations with one power unit, a 1¼-in. ball-bearing drill has a synchro-mesh transmission. This transmission instantly changes the spindle speed of the unit. It does this even while the tool is operating, from 500-250 rpm no load speed. The two-speed feature is useful in many operations including the drilling of holes from ½-in. up to 1¼-in. The drill is also equipped with a reversing switch and has full power in either forward or reverse. (Black & Decker)

For more data circle No. 80 on postcard, p. 193

Portable Furnace

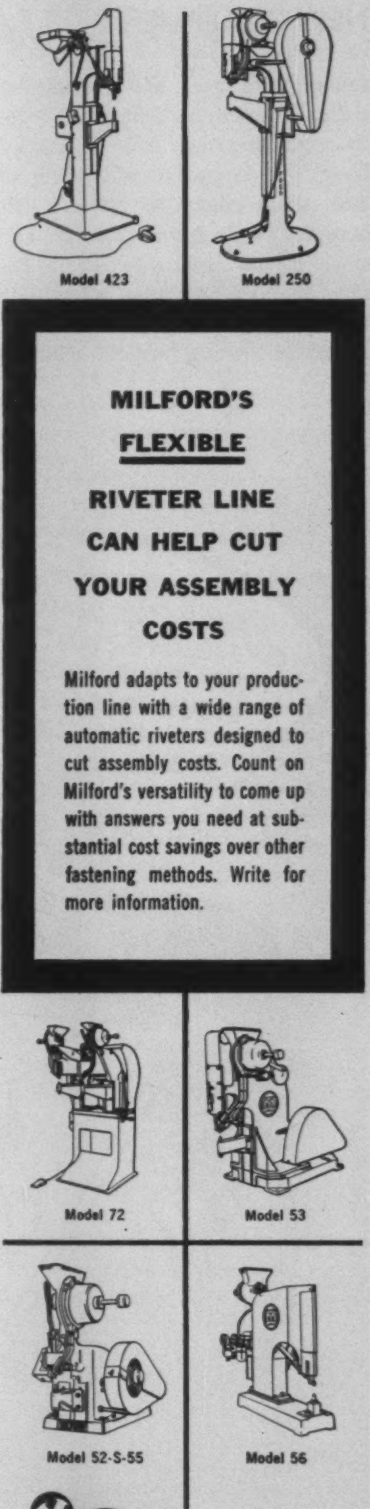
At the same time, a general-purpose furnace can be readily moved about and operated at higher temperatures (2900°F). The furnace is suited to all areas of heat treating calling for sustained temperatures up to 2900°F in normally oxidizing atmospheres. Work area is 10-in. wide x 30-in. deep x 10-in. high. Temperature controls consist of a strip-chart recording controller complete with a saturable-core-reactor package with current-limiting device. (Pereny Equipment Co.)



For more data circle No. 81 on postcard, p. 193

Casting Machine

Fully continuous, a casting machine of large and rugged construction copes with a wide production program. This program ranges from phosphor de-oxidized to oxygen-free copper. It includes round piercing and extrusion billets,


Model 423
Model 250

MILFORD'S FLEXIBLE RIVETER LINE CAN HELP CUT YOUR ASSEMBLY COSTS

Milford adapts to your production line with a wide range of automatic riveters designed to cut assembly costs. Count on Milford's versatility to come up with answers you need at substantial cost savings over other fastening methods. Write for more information.

Model 72
Model 53
Model 52-S-55
Model 56

THE MILFORD RIVET & MACHINE CO.

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ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.

square wire bars and rectangular slabs. The production capacity of the machine ranges from 3 tons per hour, for double-strand casting of 3-in. diam billets, to 10 tons per hour for single strand casting. The single strand casting is 5½- x 33-in. slabs. The machine is fed with liquid metal from a drum-type induction melting furnace, followed by a drum-type induction holding furnace. (Loma Machine Mfg. Co., Inc.)

For more data circle No. 82 on postcard, p. 193

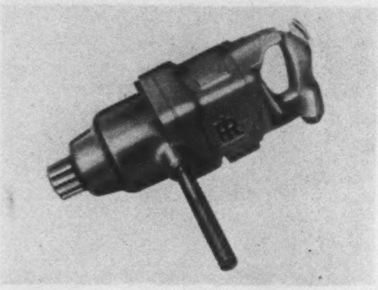
Welds and Cuts

Medium sized, a full capacity welding and cutting outfit handles most welding lines; tool, die and maintenance departments. The outfit includes: full-size heavy-duty gas regulators; full 25-ft double line hose; four welding tips; one medium-size cutting tip and all accessories. The unit welds all metals, brazes, solders and provides heat for the bending and forming of steel. It loosens frozen bolts and quickly cuts steel. The complete set comes in a rugged tool box. (Marquette Mfg. Co., Inc.)

For more data circle No. 83 on postcard, p. 193

Impact Tool

Light weight and compact, an impact tool enables one man to handle heavy nut-running jobs usually requiring two men. With a capacity of 1½-in. bolt size, the tool weighs only 33 lb without the socket. Its length is 14¾ in., measured to the shoulder of the spline drive. Side to center distance is 2½ in. Free speed is 3500 rpm at 90 psi air pressure. The tool has a built-in socket retainer which prevents sockets from falling accidentally. (Ingersoll-Rand Co.)



For more data circle No. 84 on postcard, p. 193

Cutoff Machine

For tubing, extruded shapes and bars, both ferrous and non-ferrous, an automatic cutoff machine eliminates the need for more expensive machines normally used for this work. The machine is completely air-operated. Controls for cutting head and material feed are non-electrical. It cuts most shapes to 3 in. in standard bar lengths; solid stock to 1¼ in. Feed stroke is variable from 3/16-8 in. It features quick setup for semi-automatic or completely automatic cycling. (Cleveland Pneumatic Industries, Inc.)

For more data circle No. 85 on postcard, p. 193

Bar-Stock Cut-Off

With no loss of metal, no cracked or split ends, a bar cutting machine

"YOU IDIOT, PETE, USING FERROMANURIUM IS OUT OF THE QUESTION. OUR POWERFUL NEW TURBOWHIP END BORERS WOULDN'T EVEN SCRATCH IT'S SURFACE!"
"DON'T TROUBLE YOUR MIND POINDEXTER, WE GET ARWOOD TO INVESTMENT CAST IT AND SKIP ALL THAT MACHINING JAZZ!"

Machine the simple . . . cast the complex
A complete service from design through tooling, production and finish machining. Seventy-one engineering representatives from coast to coast.
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can you use computer control *profitably?*

BAILEY 700 SYSTEMS can help you determine—one step at a time

Can computer control be used—profitably—in your steelmaking operations?

Where and how?

The answer often lies in intermediate stages of improvement in sensing, measuring, controlling, computing.

Measurements now being obtained may be insufficient, or they may be profuse. Analysis, evaluation, simplification can provide substantial improvements to the point of profitable investment return.

Bailey engineers can help you determine and prove — one step at a time — how far analog or digital systems or control can be profitably applied in your operations. Bailey is equipped, by broad experience, to provide single-source responsibility from sensing and measuring instrumentation to complete automatic control. *Bailey 700 Systems* are installed, in operation, or on order, at locations from coast to coast.

Find out what this Bailey background in instruments and control can offer you. Contact your Bailey District Office.

Where Bailey progressive automation and Bailey 700 Systems aid steelmaking operations

SINTERING—to achieve maximum quantity and quality of output at lowest cost.

BLAST FURNACES — to provide lower coke rates and higher yields.

OPEN HEARTH—to increase production and control delays.

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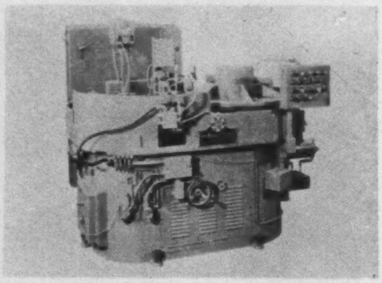
gives smooth, square and clean cuts. The machine is built in three sizes for bar stock up to 1, 2 and 2¾ in. in diam. The machine cuts round, square, hexagon, octagon and many other of the standard bar shapes. Metals cut with this machine include aluminum, brass, titanium, steel and other structural metals. The harder the metal, the better the cut. The machine will cut heat-treated bar stock without prior anneal. There are no burrs after cutting. (Salem-Brosius, Inc.)

For more data circle No. 86 on postcard, p. 193

Microhoning

A completely automatic setup microhones, at the same time, both flat surfaces of workparts. In one operation this machine generates to close tolerances, part thickness, parallelism, surface flatness and required finish. The machine stops at once when the abrasives are worn down. It also stops when the carrier plate jams or is improperly loaded. Coolant is supplied up through the center shaft. It flows over parts and abrasive disks through centrifugal force. (Micromatic Hone Corp.)



For more data circle No. 87 on postcard, p. 193

Thickness Tester

With microscopic accuracy, an instrument gages the thicknesses of coatings on iron and steel. The device provides a non-destructive means of measuring thicknesses of organic and non-magnetic metal coatings. To measure the thickness of a coating, a probe is simply applied to the surface. A closed

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Tri-Clad '55' motors with THERMO-TECTOR* system

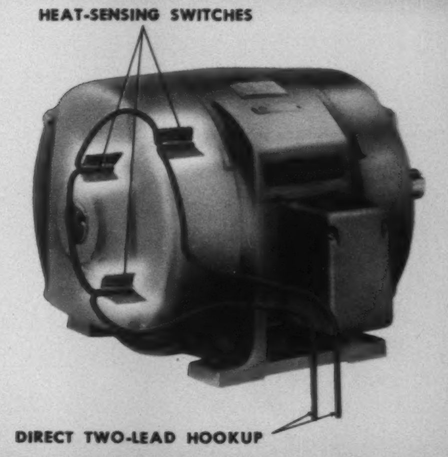
WARRANTED

against burnout from overheating

For the *first time* General Electric offers you a motor with such *positive* protection it is WARRANTED in writing against overheating burnout!

G.E.'s exclusive new THERMO-TECTOR system gives Tri-Clad '55' motors truly *inherent* over-temperature protection. Unique variable shut-off feature allows motor to deliver *full power potential* under all operating conditions. Fail-safe THERMO-TECTOR system has simple, two-lead hookup.

For the first time General Electric offers you a motor with such *positive protection* it is WARRANTED against *overheating burnout*



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TURN PAGE FOR FURTHER INFORMATION ➡ ➡ ➡

NOW–A Motor *Warranted in Writing* Against Overload Burnout!

General Electric Company warrants to the Purchaser that the Tri-Clad '55' motor with Thermo-Tector system delivered hereunder will:

(a) Not burn out because of overheating resulting from overload, lack of ventilation, single-phasing, stall, high ambient, or voltage unbalance, as long as the Thermo-Tector switches are connected into the control circuit so that power to the motor is removed when an over-temperature condition occurs;

(b) Be free from defects in material, workmanship and title; and

(c) Be of the kind and quality designated or described in the contract.

The foregoing warranty is exclusive and in lieu of all other warranties whether written, oral, or implied (including any warranty of merchantability or fitness for purpose). If it appears within one year from the date of shipment by General Electric Company that the equipment delivered hereunder does not meet the warranties specified above and the Purchaser notifies the General Electric Company promptly, the General Electric Company shall thereupon correct any defect, including non-conformance with the specifications, at its option, either by repairing any defective part or parts or by making available at the General Electric Company's plant, a repaired or replacement part.

The liability of the General Electric Company to the Purchaser (except as to title) arising out of the supplying of the said equipment, or its use, whether on warranty, contract or negligence, shall not in any case exceed the cost of correcting defects in the equipment as herein provided and upon the expiration of said one year, all such liability shall terminate. The foregoing shall constitute the sole remedy of the Purchaser and the sole liability of the General Electric Company.

General Electric's *exclusive* THERMO-TECTOR system is available now on *all* Tri-Clad® '55' motors in frames 254U-445U. Contact your General Electric Apparatus Sales Office or Authorized Distributor *today* for details on this NEW FULLY WARRANTED MOTOR PROTECTION SYSTEM. Or, write for Bulletin GEA-7092, Section 866-04, Schenectady 5, N. Y.

SMALL AC MOTOR & GENERATOR DEPARTMENT

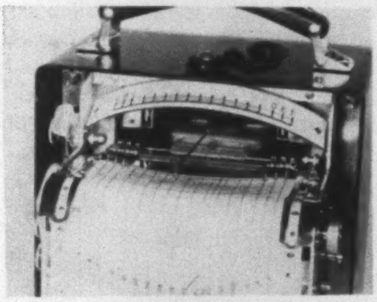
GENERAL ELECTRIC

magnetic field is created between the poles of the probe with the lines of force largely contained within the base metal. The thickness is accurately indicated on one of the direct-reading scales of the instrument. (Twin City Testing Corp.)

For more data circle No. 88 on postcard, p. 193

Analog-Event Recorder

An analog-events recorder consists of two of the company's most popular types of instruments. They place their recordings on one 6-in. chart. The center portion of the chart (3 in.) is an analog measurement. It is usually made by a basic permanent magnet moving-coil movement. By internal circuitry, it may be made to measure dc microamperes, dc milliamperes, dc millivolts, dc volts, ac volts and ac amperes. Six chronograph pens or event markers show on-off time of related events or simply time pulses. The pens can be synchronized with the analog record by marking in the enlarged margins of the same chart. (The Esterline-Angus Instrument Co.)



For more data circle No. 89 on postcard, p. 193

Multi-Purpose Lubricant

In 14-oz cartridges, a light multipurpose lubricant can be used in any lever-type gun made for cartridge grease. Installed in seconds, the cartridges cut maintenance time. Developed for general use in all industries, the lubricant is especially suitable for plain and anti-friction bearings. It is also good for rotating or sliding surfaces. It is water re-

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All-American No. 3 — Macwhyte Safe-Lock Cable Assemblies are a triple-threat specializing in uniformity, appearance, and agility . . . for manufactured products and equipment components requiring positive performance of a custom-made cable assembly. **Ask for catalog 5601.**

These All-American products are completely made in the U.S.A.

Start now to build up your All-American materials handling team. Your Macwhyte representative will be glad to coach your selections.

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Wire Rope • Slings • Cable Assemblies

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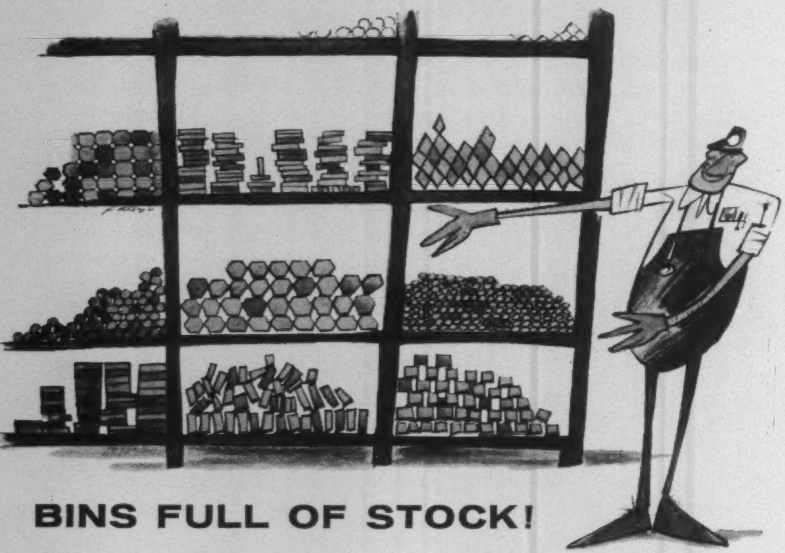

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If you use alloy steels in your operations, you will find Wheelock, Lovejoy a most useful ally. W-L offers you complete servicing of your alloy steel needs. There are seven strategically-located W-L warehouses, each of which is fully staffed by veteran metallurgists, ready to give you expert advice as to grades, applications, heat treating, etc.

Each W-L warehouse maintains complete stocks of alloy steels, including standard AISI and SAE steels, and our own HY-TEN steels, which offer advanced metallurgical features at competitive prices.

With Wheelock, Lovejoy, you merely order the steel you need—as you need it—in specified sizes, shapes, grades and treatments.

For service that's complete, and completely satisfactory, call the W-L branch nearest you.

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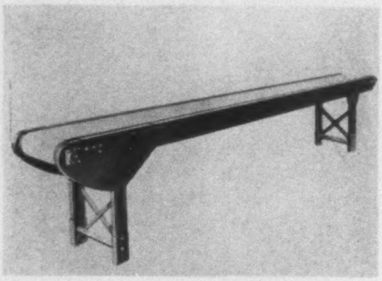
STEEL
SERVICE CENTER
INSTITUTE

pellent and unaffected by heat or cold. (Keystone Lubricating Co.)
For more data circle No. 90 on postcard, p. 193

Casting Resins

For industrial use, an unfilled polyester resin is ideally suited for small castings and for potting electronic components. It also serves well for encapsulating miniature assemblies. It cures rapidly without external heat. It can be removed from the mold one hour after casting (at 77°F.) The casting resin pours easily and fills cracks, void and contours. (Melpar, Inc.)
For more data write No. 91 on postcard, p. 193

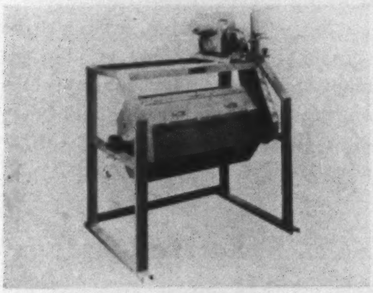
Powered Belt Conveyor



With load capacities from 200-1200 lb, a horizontal powered belt conveyor adapts to different job applications. The unit comes with the steel bed in various gages and lengths. The system can be quickly set up or changed to fit any type of moving belt operation. Such operations include assembly, sorting, inspection, packing and similar operations. All moving parts are enclosed to protect materials and workers. Standard constant belt speed is 65 fpm. Standard belting is 3-ply solid woven white cotton. (Hytrol Conveyor Co., Inc.)
For more data write No. 92 on postcard, p. 193

Barrel Finishing Units

Barrel finishing machines finish and defin both metal and plastic parts. The complete units incorporate barrels which range in size from 21-in. diam and 20-in. long to 30-in. diam and 48-in. long. They come with other single or double compartments. The units can be fitted with a variety of drives to suit individual needs. Overhead-type of



motor mounting is standard. Horsepower ratings range from ½-1 hp. (Tumb-L-Matic, Inc.)

For more data write No. 93 on postcard, p. 193

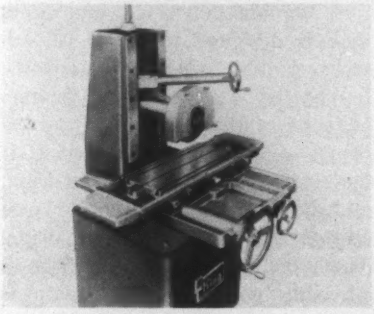
Magnet Tester

Providing laboratory accuracy at production-line speeds, a magnet testing device measures magnetic flux with repeatabilities within ¼ pct. This is comparable to a ballistic galvanometer. As many as four levels of magnetic quality can be segregated by the device in a given run of magnets. The tester also provides visual indication of test results on a built-in indicator. Tolerances for each run are preset by the operator. (Indiana General Corp.)

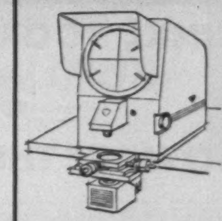
For more data write No. 94 on postcard, p. 193

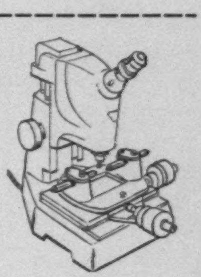
Surface Grinder

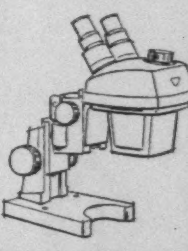
For either wet or dry grinding, a precision surface grinder has a longitudinal table travel of 20 in. The cross feed is 14 in. A grinding wheel diameter of 12 in. allows a



15-in. vertical clearance over the table. The "T"-slotted table travels on precision-ground ways. The grinder has adjustable table stops. The machine features a 10- x 20-in.







Let's talk about YOUR precision measurement problem!

Do you need fast, accurate measurements to a "tenth" or better? Some contour, an angle? Or odd-shaped small parts that have to meet tight tolerances in *all* dimensions?

Maybe all you need is a reticle in an eyepiece of our popular new StereoZoom® Microscope. Or the critical accuracy of our Toolmakers' Measuring Microscope. Or perhaps our Bench Comparator, for the dual capability of measurement *and* silhouette comparison. Or—but why just guess about it?

We have a complete line of optical measuring instruments ready to help you. More than that, we'll be glad to suggest the equipment that will do the job best, at lowest cost. No obligation, of course. Just drop the coupon in the mail today and let our experts brainstorm your problem.

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My measuring problem is ....

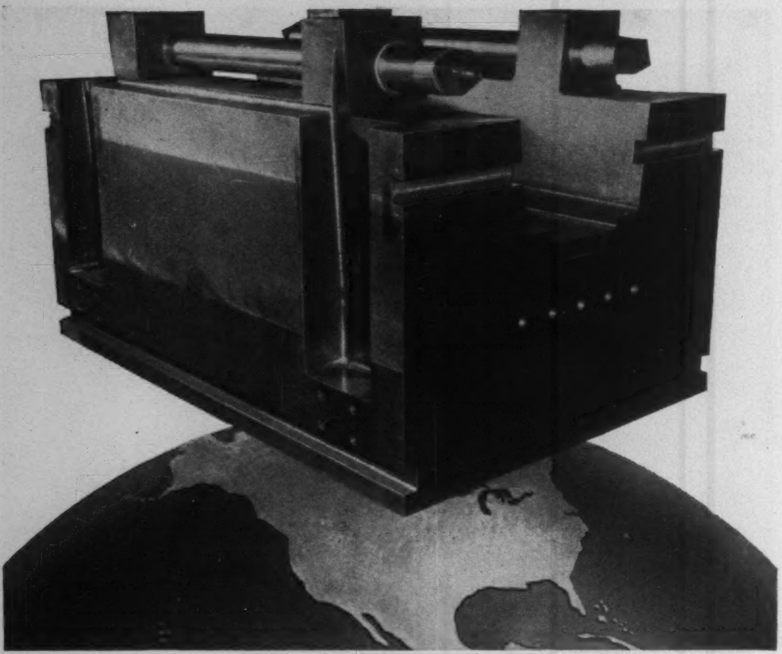
Please advise, with no obligation on my part.

NAME, TITLE ....

COMPANY ....

ADDRESS ....

CITY .... ZONE .... STATE ....



FINKL TOOK 115,000 POUNDS OF STEEL
35 MILES UP*
TO MAKE THIS 36,000 POUND DIE HOLDER

*The Finkl Process of vacuum degassing steel in the ladle duplicates the atmosphere found at an altitude of 35 miles above the earth.

In this rarefied atmosphere, unwanted hydrogen, oxygen, non-metallic inclusions, and other impurities are literally boiled out of the molten steel, producing cleaner, tougher, stronger, more ductile, flaw-free products.

This 36,000 pound, 40" x 44" x 64" die holder is used in a heavy duty press. It was made of Finkl FX analysis, Temper 4, and finished machined in our shops.

All Finkl die blocks and hot work die steels are made from vacuum degassed electric furnace material produced in our own melt shop. Because of the clean, greatly improved qualities, you get more forging production, less downtime due to breakage, and savings in fewer tool regrinds.

You get more from Finkl in quality, continuing research, and engineering service. Call your Finkl representative for your forging, hot work die steel, and die block needs.

DIE BLOCKS · FORGINGS · ELECTRIC FURNACE STEELS · HOT WORK STEELS

SPECIFY FINKL DIE BLOCKS FOR "IMPRESSIONS THAT LAST"

A. Finkl & Sons Co.
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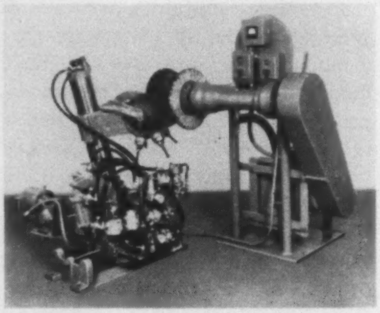
BOSTON • LOS ANGELES Warehouses in: CHICAGO • DETROIT • BOSTON • LOS ANGELES

working surface when used for wet grinding. The unit has a direct-drive spindle, powered by a 1½-hp balanced motor. The spindle rotates on pre-loaded precision ball bearings. (King Machine & Mfg. Co.)
For more data write No. 95 on postcard, p. 193

Buffs Spherical Shapes

Spherically-shaped products can be automatically finished with a piece of special equipment. It consists of a special automatic fixture machine which operates in conjunction with the company's standard lathe with a shaped buff. The fixture machine has an oscillating motion which turns and spins the sphere as it comes in contact with the shaped buffing wheel. The work piece rides on protective finish pads which are easily adjustable for wear compensation. (Murray-Way Corp.)
For more data write No. 96 on postcard, p. 193



Truck and Drain Rack

A combination truck and drain rack is designed for users of solvents, cutting oils and detergents. It can be easily moved through crowded, narrow aisles and around heavy machinery. The truck is loaded by tilting it against the drum, and sliding the steel fingers down to engage the top rim of the drum. Then, the truck is rocked back to wheeling position and loading is automatic. A slight downward push on the truck handles raises the wheel and lays the rack on the floor. This provides convenient drain of the drum. (The Palmer-Shile Co.)
For more data write No. 97 on postcard, p. 193

NEW FILMS

"How to Locate Flaws with Dye Penetrants" visually demonstrates every aspect of dye-penetrant inspections; from laboratory theory to authentic production-line techniques. They were actually filmed on location during mass-production dye penetrant inspections. The laboratory sequence describes the theory behind dye penetrants in detail. It also outlines the proper methods of insuring complete inspection accuracy. Full color. 16 mm. Sound. 23 minutes. Turco Products, Inc., 24600 S. Main St., Wilmington, Calif.

"Nucerite," a material of construction, is the subject of a new film. Nucerite is a new ceramic metal composition which exhibits good resistance to attack in hot, corrosive environments. The film first shows the steps taken in manufacturing the ceramic metal. Then, the film graphically depicts various tests to which the material has been subjected. Sound. Color. 16 mm. 16 minutes. The Pfaudler Co., 1123 West Ave., Rochester, N. Y.

"The All New Gas Clarklift" illustrates important design features of the company's line of fork trucks. The slide film points out benefits of these features to users. Some of the points covered in the film include: fast lifting speeds, easy service accessibility and maximum maneuverability. Sound. Color. 20 minutes. Clark Equipment Co., Battle Creek, Mich.

"Fundamentals of Manual Shielded Arcwelding Techniques," in one part, covers flat and horizontal arcwelding techniques. The second part of the film studies vertical and overhead arcwelding procedures. Very clear camera close-ups of the welding arc, in actual operation, are featured in the film. The four basic principles of arcwelding are graphically explained in the film. Color. 16 mm. Sound. 45 minutes. Air Reduction Sales Co., 150 E. 42nd St., New York 17.

COUPLING A BILLION HORSEPOWER

WHEN YOU NEED HELP IN A HURRY—

Koppers coupling service cuts costly down-time

Not every coupling service need is an emergency. But it's the emergencies that really test a good organization. That's why Koppers maintains experienced field engineers and outstanding stock facilities throughout the country. In addition, if it's a Fast's Coupling you're replacing, we have a serial number and specific application history for every Fast's for easy re-ordering. And our modern manufacturing facilities have the extra capacity to lick an emergency for special requirements.

Example: A modern windowless bank in Georgia was able to open for business as usual only because Koppers flew in a completed replacement coupling for its air conditioning unit. Elapsed time . . . request phoned to Baltimore after 10 in the evening . . . coupling arrived before 7:30 next morning.

KOPPERS COMPANY, INC., 211 Scott St., Baltimore 3, Md.

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FAST'S COUPLINGS

Engineered Products Sold with Service

Tilting 700-tons of steel furnace

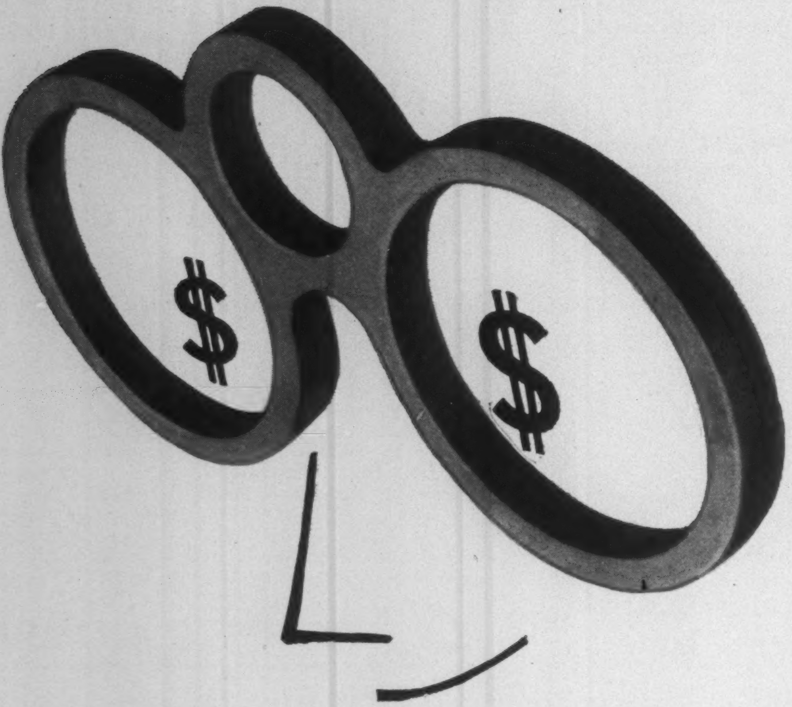
CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

Here's a closeup of tilting mechanism for an electric furnace. Standard, stock model, double-reduction Cone-Drive **double-enveloping worm** gear speed reducer tilts furnace and heat with combined weight of 700 tons.

Powerful Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

Now . . . Look to Lukens For Steel Shape Savings



Looks like a steel freight savings of $1663.47

The owl-eyed steel shape pictured above is a 3½" gage shackle plate. It weighs 483 lbs. and was flame cut to special tolerances in one of Lukens' fabricating shops. A customer ordering 50 of these from—say—600 miles away would pay a freight charge of only $493.89 on the pieces.

However, if the same customer decided to flame cut the parts himself, 106,800 lbs. of 3½" gage steel plate stock would be required. Cost of shipment . . . $2157.36. Extra cost to the customer on freight alone . . . $1663.47. *Plus* . . . the expense of his equipment investment . . . the tie-up of his capital in plate stock . . . the cost of handling 75% scrap . . . the problem of shop spoilage.

Moral: Don't pay freight on scrap. Contact Lukens for Steel Plate Shapes Service . . . flame cutting, shearing, blanking, bending, pressing, welding—of carbon and alloy plate produced on our own rolling mills. Call or write Fabrication Building, Lukens Steel Company, Coatesville, Pennsylvania. Address Dept. A-110.

LUKENS STEEL COMPANY
A-110 Fabrication Building
Coatesville, Pa.

Please send me your free booklet on Steel Plates Shapes.

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steel plate shapes

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The Iron Age Summary

Little Change in Steel Demand

Setbacks in automotive steel must be offset by general orders to keep the market at its present level.

But order volume from diverse industries seems to be picking up. But no marked change is expected soon.

- The steel market is marking time waiting for a major shift in business to bring about an upturn.

Factors now influencing the market are of a spot, or short-term nature. Although the bottom has been reached, it may be next March before any real change affects the market.

Short-Term Factors—These are the short-term factors that will influence week-to-week steel operations:

1. Steel mills have been building up their own inventories of finished and semi-finished steel. This, in itself, has injected an inflationary factor into the operating rate. With inventory building at the mill coming to an end, the steel operating rate could drop off a few points.

2. Cutbacks in automotive steel for November and December have hit any recovery hopes hard.

3. The volume of new orders from a wide range of general users has picked up recently. This tends to offset the set-back automotive orders.

Price Outlook—In spite of the weak market, steel prices are holding fairly well. There is some playing with specialty prices. Some corner-cutting in the grading of sheets and strip appears to be going on. Producers are absorbing more freight to get orders. There is shading of prices in the area of fabricated products.

But few concessions are being made on most standard products, it is reported.

For most products, the mill that can deliver first will get the order. This has placed strong pressure on mill scheduling and is giving steelmen headaches as they try to fill a rolling schedule and still promise fast delivery. Most mills are stocking more inventory than they had ever believed possible.

Auto Outlook Gloomy—In Detroit, where many of the steel companies have been getting their sustaining automotive orders, the outlook is gloomy.

The November car-making schedule is 550,000, down from 618,000 in October. The December schedule, then, would seem to be in the 535,000 area to fill out the fourth quarter program of 1.6 million cars.

Orders Coming In—Orders for steel to be used in December are now coming in. They confirm the expected drop in December output. Furthermore, because October schedules fell below anticipation, it's likely that some automakers increased their steel inventories during the month.

In another development, the new, longer warranty periods offered by most automakers this year are putting the emphasis on quality. This puts the heat on suppliers, including steelmakers, to deliver quality materials. Inspection is tougher than ever.

With the steel market in its present weakened condition, the auto p. a.'s can be particular.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,461	1,478	1,579	1,291
Ingot Index				
(1947-1949=100)	91.1	92.0	98.3	80.4
Operating Rates				
North East Coast	56.0	54.0*	62.0	51.0
Buffalo	53.0	59.0*	56.0	45.0
Pittsburgh	47.0	48.0*	46.0	44.0
Youngstown	39.0	42.0	46.0	40.0
Cleveland	57.0	59.0*	56.0	41.0
Detroit	69.0	64.0*	69.0	46.0
Chicago	51.0	52.0*	60.0	42.0
Cincinnati	55.0	58.0*	62.0	66.0
St. Louis	74.0	73.0*	78.0	92.0
South	53.0	52.0*	51.0	31.0
West	47.0	46.0*	56.0	44.0
U. S. Rate	51.4	51.9	55.4	45.6

*Revised

Source: American Iron and Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.32	$66.32	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$28.33	$28.17	$29.83	$46.17
No. 2 bundles	$18.50	$18.50	$20.17	$31.50
Nonferrous				
Aluminum ingot	26.00	26.00	26.00	26.80
Copper, electrolytic	30.00	30.00	33.00	30-33
Lead, St. Louis	11.80	11.80	11.80	12.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	104.00	104.00	103.75	101.375
Zinc, E. St. Louis	13.00	13.00	13.00	12.50

New Castings Book Aids P. A.'s

The 1960 Steel Castings Handbook has been designed to aid the user and potential user of steel castings.

Written in a clear concise style, the book should prove a handy reference guide.

▪ Steel foundries may not be pouring as many castings these days, but they're still knocking on the purchasing agent's door.

This month the foundrymen are circulating the latest and practically only major text of its kind on steel castings to their customers, students and their own shop men—the 1960 Steel Castings Handbook of the Steel Founders Society of America, Cleveland.

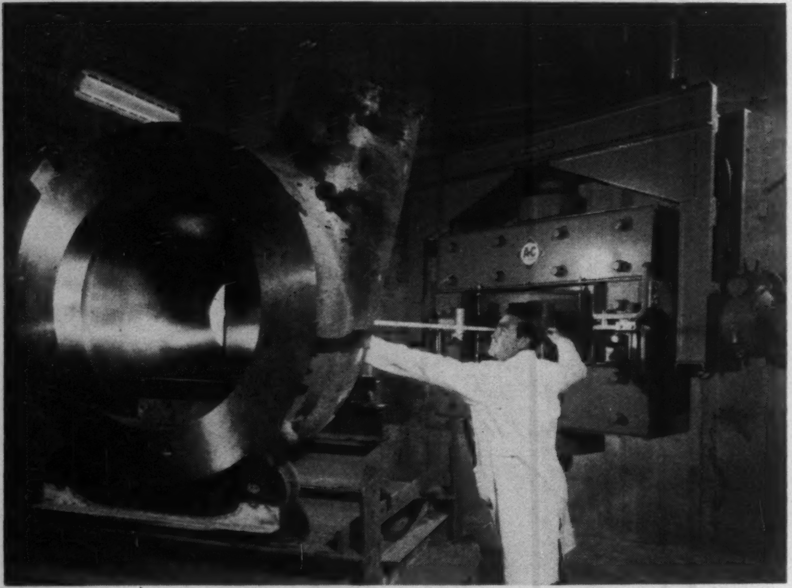
Clear, Concise—"This latest edition just off the press has the first chapters written in non-technical clear style for purchasing agents so they can get the most out of it without getting bogged down in details," says F. Kermit Donaldson, executive vice president.

"This and the remaining part of the 670 page book is directed frankly toward the user and prospective user rather than regular customers.

"There is no comparable college text. So we are sending copies gratis to engineering colleges and also putting out a special low price student edition.

New Data—"Of particular value to all readers of the book are tables on new design data resulting from research projects in which the Society has been engaged. These are principally the development of comparable fatigue properties between cast and wrought steels and between cast and welded structures. In addition there is thorough analysis of the effect of stress concentration and proper design to minimize it. These tables are only a few pages long and don't look like much. But they are the fruit of the better part of 10 years of long fatigue test research we have participated in at Case Institute of Technology and Massachusetts Institute of Technology. They have never been available before."

The book was put together over the last 2 years by the technical staff of the Steel Founders under the editorship of Chas. W. Briggs, technical and research director.



INSPECTION: This nuclear pump volute is being set up for Betatron inspection at Electric Steel Foundry Co. ESCO cast nine such volutes, weighing 7000 lb apiece, for the Worthington Pump Co.

Steel Casting Market Off From 1959

Steel castings market this year is off from a year ago due to general business decline. Although shipments won't equal last year's 1,413,227 tons, they won't be out of sight. During the first half of this year, shipments were down 4.1 pct from the same period last year, according to compilations of the Steel Founders Society of America, Cleveland. For the second half, comparisons are somewhat invalid because of the steel strike.

The pattern of markets for steel castings over the last 10 years has changed principally only insofar as different consuming industries have been having good times or bad, rather than any big new applications. Figures being compiled for a new statistical summary indicate the following major markets by tons shipped:

Railroads, 35 pct; construction machinery, 13 pct; rolling mills, 10 pct; oil and gas field valving and piping, 6 pct; heavy trucks, 4 pct; mining and crushing machinery, 3 pct; and military, 5 pct.

WHY BIG THINGS ARE HAPPENING IN INDUCTION MELTING

Everybody likes change! Particularly the kind of money-saving changes introduced by Inductotherm to induction melting in the past seven years.

To the basic advantages of induction melting, Inductotherm has added features that assure lower costs by simplifying installation, speeding operation, and reducing service requirements.

- Inducto® power feed through tilting furnace trunions cuts the cost of pit construction; saves power losses by reducing cable length.
- Rigid, heliarc welded furnace frame construction improves furnace life and lining life.
- Prepackaged, pretested Inducto control centers take the time, trouble, and expense out of control installation; make start-up swift, sure, and easy.
- The most space-saving induction melting systems ever available are the Inducto "Integral" series, which package motor-generators, capacitors, transformers and all controls *in one compact console!*

Big things are happening in induction melting because Inductotherm is making them happen. But the biggest innovation has been the Inductotherm concept of service. Not just fast repairs and overnight replacement of any parts . . . but the fact that *Inductotherm is in business to fit induction melting to your needs.* We will do everything in our power to improve our equipment and the induction technique, never asking you to trim your requirements to the limitations of our equipment.

If you'd like more information on Inductotherm furnaces, write for Bulletin 70. But, for a taste of Inductotherm service, ask to have an engineer call. Inductotherm Corporation, 412 Illinois Avenue, Delanco, New Jersey.

INDUCTOTHERM

Stock Shipments Help Mills Land Orders

Mills are making fast deliveries from stocks of steel already laid down.

It's necessary because slight delays in making shipments may lose an order.

▪ To land orders, mills continue filling requests for fast delivery from stocks of semi-finished and finished steel products.

With the market slack, this approach is necessary to stay competitive. Buyers are not content to wait for the next rolling. If they can't get rapid shipment from one mill, they will try another.

Mill Stocks Large—As a result, mill inventories are high in material needed to fill tonnage orders of sheet, strip, bar, pipe, wire, plates, and shapes.

Typical is the situation in standard pipe. Shipments from mill stocks are delivered by truck to construction job sites in about four to six days. Builders usually wait until the last minute to phone in those orders. Then they combine enough tonnage to make up a mill-size order. And the mills make delivery from stocks of pipe set aside for this type of order.

In bar products, customers are often buying on one-week delivery, watching the mill rolling cycles. A 24-hour difference in delivery promises can lose an order for a mill.

Most Products Included — Even orders for construction products like plates and shapes follow the same pattern. Buyers wait to the last possible moment before placing orders. Then it's up to the mills to get the steel delivered or lose the business.

Steel service centers use the same system. They sell to customers who want fast delivery on small quantity orders. Then the warehouses order replacement quantities from their mill sources.

Sheet and Strip—There's less interest in ordering among both auto and general buyers of flat-rolled. A **Pittsburgh** area mill estimates November shipments will drop back to the level of August. Prospects for December are not encouraging steel producers. Appliance makers in the **Midwest** are loaded with finished goods inventories. Only a relative few are placing tonnages—and these are for small amounts. **Chicago** area producers are operating at about 60 pct of capacity. Deliveries for most sheet and strip items are on a two-week basis. Mills there see a declining sheet demand next month, with only a mild recovery in January.

Bar—While orders are still off, some areas report a slightly better tone to sales. **Detroit** mills say November orders should be about the October level. One mill reports more bar capacity is being used than sheet and strip capacity. Inquiries are good. However, **Chicago** bar-makers say a recent pickup in demand seems to be slowing down again. Bar mills there are operating at less than 50 pct of capacity.

Pipe and Tubing—Orders for oil country seamless picked up in October. A **Pittsburgh** mill points out the month was the best since April. However, the gain still leaves shipments at a low level. Pipe distributors have improved sales slightly—but it isn't showing up in their mill orders.

Wire Products—Users and distributors of manufacturers wire are ordering only what they must have. The same situation applies to construction wire products. Mills are carrying stocks of finished and semifinished to make fast shipments. Merchant wire products are off seasonally.

PURCHASING AGENT'S CHECKLIST

Durable goods makers are pushing quality control, inspection systems, and reliability to meet greater buyer demands for quality and service. P. 131

Machine tool builders expect buying stimulated by exposition to show up in new orders this month and next. P. 149

Bethlehem, Byers Push Steel Pipe

Two new developments in the steel pipe market were announced last week.

High-strength large-diameter steel pipe for cross-country transmission of high-pressure natural gas is now being produced at Bethlehem Steel Co.'s new expanded linepipe mill at Steelton, Pa.

And, A. M. Byers Co. plans to market steel pipe on a national basis.

A. S. Chalfant, Byers' vice president-sales, says, "Steel pipe is immediately available at competitive prices. We are prepared to handle orders in a wide range of sizes, finishes, and weights in A53 and A120 pipe grades."

Inventories for Byers steel pipe will be maintained in Sharon, Pa.

To Triple Production — Bethlehem's new mill is expected to triple gas pipe production at Steelton. Approximately 25,000 tons of pipe from 18 to 42 in. in outside diameter can be produced each month.

COMPARISON OF PRICES

(Effective Nov. 8, 1960)

Steel prices on this page are the overage of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Nov. 8 1960	Nov. 1 1960	Oct. 11 1960	Nov. 10 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plate (1.50 lb.) cokes	$10.65	$10.65	10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire Rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Nov. 8 1960	Nov. 1 1960	Oct. 11 1960	Nov. 10 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.11	$70.11	$70.57	$70.57
Foundry, South Cin'ti	71.92	71.92	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	69.61	69.61	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.32	$66.32	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$26.50	$26.50	$29.50	$47.50
No. 1 steel, Phila. area	33.00*	32.50	33.50	46.50
No. 1 steel, Chicago	25.50	25.50	26.50	44.50
No. 1 bundles, Detroit	21.50	21.50	25.50	42.50
Low phos., Youngstown	28.50*	27.50	32.00	51.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	55.50
No. 1 mach'y cast, Phila.	48.50	48.50	49.50	53.50
No. 1 mach'y cast, Chicago	41.50	41.50	41.50	64.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$28.33*	$28.17	$29.83	$46.17
No. 2 bundles	18.50	18.50	20.17	31.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	33.00	30-33
Copper, Lake, Conn.	30.00	30.00	33.00	33.00
Tin, Straits, N. Y.	104.00†	104.00	103.75	101.375
Zinc, East St. Louis	13.00	13.00	13.00	12.50
Lead, St. Louis	11.80	11.80	11.80	12.80
Aluminum, ingot	26.00	26.00	26.00	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Is the Market On Bottom?

Scrapmen in Pittsburgh and Cleveland feel the bottom may have been reached and the upturn could be near.

However, the general market is still weak with prices going lower.

▪ Scrapmen in Pittsburgh and Cleveland feel the market may have reached its bottom and could rebound soon. However, the general market tone is still one of weakness with prices continuing to fall.

An upward reversal of railroad list prices in Pittsburgh has been taken by some to mean the market overshot its true level on the way down. In Cleveland, some buyers are out to pick up bargains.

On the other hand, Philadelphia scrapmen feel the market will ease even more, especially in exports. The slightly firmer tone of the St. Louis market last week has disappeared, and Houston appears to be heading for further drops.

Due to a price spread in Philadelphia, The IRON AGE composite price for No. 1 heavy melting rose slightly to $28.33 this week. The composite price between January and October of this year dropped 29 pct with an average of $33.80. This is compared to a $39.83 average for the first ten months of last year. The five-year average between 1955 and 1959 is $43.87.

October's composite price of $29.67 was the lowest since August, 1954.

Pittsburgh—First signs of a market stiffening, or even a rebound, appeared this week. On an early list, No. 1 railroad heavy melting sold for as low as $27 which is $3 under last month's price. A later list had the same grade going to domestic bidders for $31.50, representing a return to last month's level. The railroad price reversal is taken by some to indicate the market had overshot its true level on the way down.

Chicago—The market is hanging uncertainly at previous price levels. While mills have made new offers at reduced prices, these have been offset to some extent by purchases of small lots at previous price levels. At the same time, brokers admit that it is increasingly difficult to pick up scrap at these prices and that they are hesitant to sell short for the rest of November. Additional declines are still regarded as possible during December.

Philadelphia—Purchases of No. 1 heavy melting by an area mill at $34 widened the spread for openhearth grades. The same mill bought No. 2 heavy melting for $28, a drop of $1 from the previous week. In spite of the mill buying, the domestic market is still weak. Exports are easing.

New York—Scrap is moving in this market, but it's mostly filling old export orders. Dealers say foreign buyers are getting comfortable. They are still buying, but much more selectively.

Detroit — Opinion differs on whether or not prices will continue to drop. Some think the bottom has been reached and the market will hold at current levels through the rest of the year. Others expect a decline in No. 1 bundles because export support is gone. Canada also appears to be quiet.

Cleveland—The price drops seem to have hit bottom and a few buyers are out to pick up the bargains. A valley mill bought No. 2 bundles for $21 and a small lot of industrial scrap went for $29. Some other yard scrap went for $28 on an inside sale.

Cincinnati — Dealer bundles are moving in the area at $1 over dealer heavy melting which generally must go out of the market. Some small shipments are going on the river. Foundry business is slow.

St. Louis — The slightly firmer tone which prevailed last week has all but disappeared. The mill is still buying but is more selective and in a more restrictive manner.

Birmingham — An Atlanta mill bought No. 2 heavy melting scrap this week at $2 under last month. No. 1 cast and stove plate grades also dropped $1. Turnings went down and a Birmingham electric furnace cut its price on bundles and 3-ft electric furnace steel.

Buffalo—Dealers expect no mill purchases in November. The market is weaker and all prices are down. No. 2 bundles, all turnings and borings, No. 1 machinery cast, and No. 1 cupola cast are off $1. All others are down $2.

Boston — There are no price changes, but dealers couldn't give away shoveling turnings and chemical borings. There is nothing doing and the market continues weak.

West Coast—The domestic market is at a virtual standstill and prices are soft all along the coast. Export activity still sustains the struggling market.

Houston—The market appears headed for further weakness. A spokesman for the district mill expresses doubt that there will be any new purchases by the mill through 1960.

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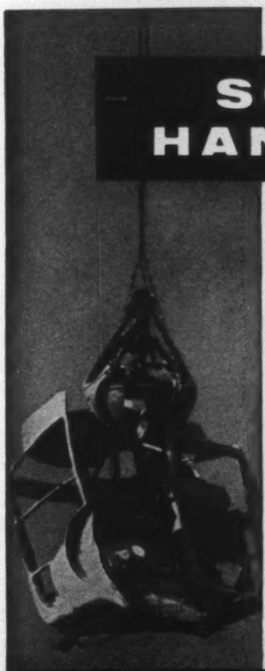

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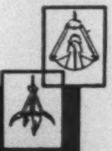

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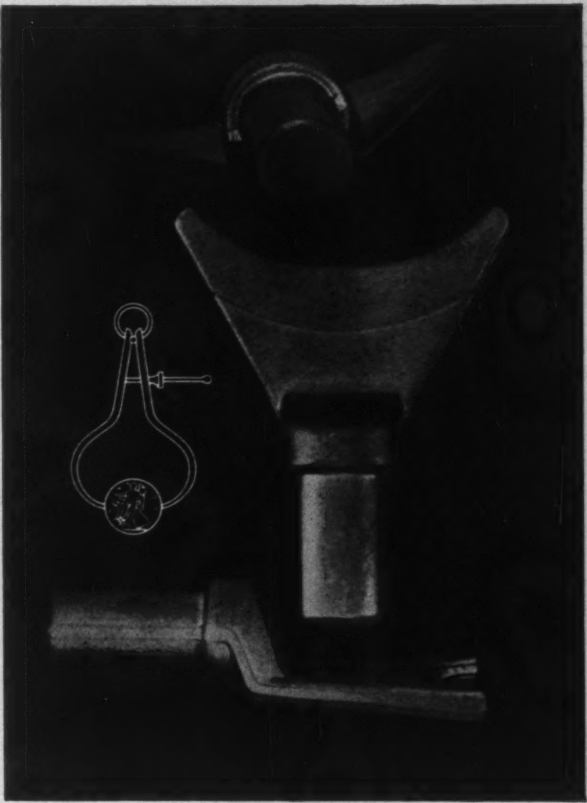

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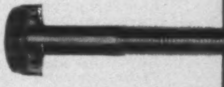

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SCRAP PRICES *(Effective Nov. 8, 1960)*

Pittsburgh

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	27.00 to 28.00
No. 1 factory bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	26.00 to 27.00
Machine shop turn.	11.00 to 12.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	15.00 to 16.00
Low phos. punch'gs plate	32.00 to 33.00
Heavy turnings	23.00 to 24.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rails, random lgth.	41.00 to 42.00
Rails 2 ft. and under	46.00 to 47.00
RR specialties	35.00 to 36.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	25.00 to 26.00
No. 1 factory bundles	29.00 to 30.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	25.00 to 26.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Low phos. forge crops	37.00 to 38.00
Low phos. punch'gs plate, ¼ in. and heavier	33.00 to 34.00
Low phos. 2 ft. and under	31.00 to 32.00
No. 1 RR hvy. melting	29.00 to 30.00
Scrap, rails, random lgth.	37.00 to 38.00
Rerolling rails	48.00 to 49.00
Rails 2 ft. and under	41.00 to 42.00
Angles and splice bars	38.00 to 39.00
RR steel car axles	46.00 to 47.00
RR couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	41.00 to 42.00
Cupola cast.	36.00 to 37.00
Cast iron wheel	27.00 to 28.00
Malleable	40.00 to 41.00
Stove plate	30.00 to 31.00
Steel car wheels	35.00 to 36.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 bundles and solids	75.00 to 80.00
430 turnings	40.00 to 45.00

Philadelphia Area

No. 1 hvy. melting	$32.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	33.00 to 35.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	34.00 to 36.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast, chem. borings	23.00 to 24.00
Low phos. 5 ft and under	35.00 to 36.00
Low phos. 2 ft punch'gs	37.00 to 38.00
Elec. furnace bundles	34.00 to 35.00
Heavy turnings	25.00 to 26.00
RR specialties	38.00 to 39.00
Rails, 18 in. and under	47.00 to 49.00
Cupola cast	37.00 to 38.00
Heavy breakable cast.	36.00 to 37.00
Cast iron car wheels	39.00 to 40.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	48.00 to 49.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.50 to $23.50
No. 2 hvy. melting	19.50 to 20.50
No. 1 dealer bundles	23.50 to 24.50
No. 2 bundles	15.00 to 16.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. 18 in. and under	31.00 to 32.00
Rails, random length	37.00 to 38.00
Rails, 18 in. and under	45.00 to 46.00
No. 1 cupola cast	35.00 to 36.00
Hvy. breakable cast.	28.00 to 29.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	21.50 to 22.50
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	28.00 to 29.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Cleveland

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	17.50 to 18.50
No. 1 dealer bundles	23.50 to 24.50
No. 1 factory bundles	27.00 to 28.00
No. 2 bundles	16.50 to 17.50
No. 1 busheling	23.50 to 24.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft. & under	30.00 to 31.00
Low phos, punch'gs plate	24.50 to 25.50
Drop forge flashings	23.50 to 24.50
Foundry steel, 2 ft. & under	29.00 to 30.00
No. 1 RR hvy. melting	27.00 to 28.00
Rails 2 ft. and under	44.00 to 45.00
Rails 18 in. and under	45.00 to 46.00
Steel axle turnings	20.00 to 21.00
Railroad cast.	41.00 to 42.00
No. 1 machinery cast.	41.00 to 42.00
Stove plate	36.00 to 37.00
Malleable	43.00 to 44.00
Stainless	
18-8 bundles	175.00 to 180.00
18-8 turnings	70.00 to 75.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 busheling	23.00 to 24.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	11.00 to 12.00
Low phos. plate	31.00 to 32.00
Structurals and plate, 2 ft. and under	33.00 to 34.00
Scrap rails, random lgth.	32.00 to 33.00
Rails 2 ft. and under	42.00 to 43.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	26.00 to 27.00
Foundry steel, 2 ft.	28.00 to 29.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	16.00 to 17.00
No. 1 RR hvy. melting	28.00 to 29.00
Rails, random lengths	35.00 to 36.00
Rails, 18 in. and under	37.00 to 38.00
RR specialties	34.00 to 35.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	32.00 to 33.00
Stove plate	34.00 to 35.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	45.00 to 46.00
Unstripped motor blocks	34.00 to 35.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	28.00 to 29.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	29.00 to 30.00
Elec. furnace, 3 ft. & under	32.00 to 33.00
Bar crops and plate	37.00 to 38.00
Structural and plate, 2 ft.	36.00 to 37.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rail, random lgth.	36.00 to 37.00
Rails, 18 in. and under	43.00 to 44.00
Angles and splice bars	37.00 to 38.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	34.00 to 35.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	19.00 to 20.00
No. 2 dealer bundles	14.00 to 15.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakabe cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$18.00 to $19.00
No. 2 hvy. melting	15.00 to 16.00
No. 1 dealer bundles	21.00 to 22.00
No. 2 bundles	14.00 to 15.00
No. 1 busheling	18.00 to 19.00
Drop forge flashings	18.00 to 19.00
Machine shop turn.	6.00 to 7.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	9.00 to 10.00
Heavy breakable cast.	23.00 to 24.00
Mixed cupola cast.	30.00 to 31.00
Automotive cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	150.00 to 155.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 dealer bundles	22.00 to 23.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	22.00 to 23.00
Machine shop turn.	3.50 to 4.50
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	30.00 to 31.00
Heavy breakable cast.	25.50 to 26.50

San Francisco

No. 1 hvy melting	.... $32.00
No. 2 hvy. melting	.... 29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	.... 18.00
Machine shop turn.	.... 14.00
Cast iron borings	.... 45.00
No. 1 cupola cast.	46.00 to 48.00

Los Angeles

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	.... 25.00
No. 2 bundles	.... 17.00
Machine shop turn.	.... 12.00
Shoveling turnings	.... 13.00
Cast iron borings	.... 13.00
Elec. furnace 1 ft. and under (foundry)	.... 41.00
No. 1 cupola cast.	38.00 to 39.00

Seattle

No. 1 hvy. melting	.... $33.00
No. 2 hvy. melting	.... 31.00
No. 2 bundles	.... 21.00
No. 1 cupola cast	.... 36.00
Mixed yard cast.	.... 31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	.... $25.80
No. 2 hvy. melting cut 3 ft. and under	.... 22.50
No. 1 dealer bundles	.... 25.80
No. 2 bundles	.... 19.00
Mixed steel scrap	.... 16.00
Bush., new fact, prep'd	.... 25.50
Bush., new fact, unprep'd	.... 20.45
Machine shop turn.	.... 10.00
Short steel turn.	.... 12.00
Mixed bor. and turn.	.... 12.00
Cast scrap	.... 33.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	.... $32.00
No. 2 hvy. melting	.... 29.00
No. 2 bundles	.... 20.50
Machine shop turn.	.... 8.00
Shoveling turnings	.... 11.00
Cut structural plate 2 ft. & under	$40.00 to 41.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

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Aluminum Can Stock Price Shaved

Price shaving to the point of doubtful profit underscores the competitive metal can market.

It could be part of a normal pricing pattern of a new material trying to find its place, and its price level.

▪ A small drop in price for aluminum coil stock for canmaking underlines the hot competition for the metal can market.

In this case, Reynolds Metals dropped its price from 32.5¢ per lb to 32.2¢, a cut of less than 1 pct. Actually, Reynolds was just meeting a previous cut by Kaiser Aluminum and Chemical Corp. which was instituted last August. Kaiser cites a previous drop by Alcoa.

Profit Motive?—The move puts the price down to the point where it is doubtful if the aluminum companies will make a profit on the product. Apparently, they made the cut to hold new gains in the frozen citrus market which are threatened by new thin tinplate.

The move also points up the competition for the market within the aluminum industry itself as well as against tinplate. The metal can market now is one of the hottest in industry with both steel and aluminum makers fighting to hold and increase their share.

Narrow Spread—The price shaving points up the narrow spread between sheet stock for canmaking and primary metal. Depending on whether it's coil or sheet, the price differential runs from 4.7¢ to 6.2¢ per lb.

A spokesman for one aluminum company says "very little profit" is now being made on the item. Another says he doesn't believe any profit is being made. But, he adds, if sales grow as producers hope, the volume could create a profit without much, if any, price hike.

Another aluminum man gives this opinion: "Book price on this item doesn't mean a thing. It's all developmental material anyhow." He believes the market is going through fluctuations that are normal with any new material trying to find its place, and its price level.

Solution Suggested To Import Problem

Should nonferrous industries cooperate with each other to solve import problems? Several industry experts believe they should.

One area where this could apply: Industry should supply advisors to government representatives negotiating with other countries under the General Agreement on Tariffs and Trade.

In Agreement—Irving Lipkowitz, leading economist for Reynolds Metals Co., suggested this last week to members of the Copper and Brass Research Assn. at Atlantic City. A similar suggestion was made to aluminum warehousemen by Clayton Grover, Whitehead Metals Co.

Why is this so important? There are over 60,000 items on the GATT list, points out Mr. Lipkowitz. And almost 2400 are currently under negotiation. Yet, there is no liaison between government and industry.

Be Prepared — Advisors should be knowledgeable, working spokesmen, not just big names in the industry, the economist says. In addition: "U. S. industry, and particularly the nonferrous companies, must also cooperate in putting together information that will effectively tell the story of the import problem.

"For instance," Mr. Lipkowitz says, "just averaging our wage costs isn't enough. We must assemble the full package, including all fringes, so we can match foreign figures exactly."

The Reynolds economist calls for a functional, positive relationship between government and industry. He points out that the import problem isn't likely to get any better soon.

Tin prices for the week: Nov. 2—104.00; Nov. 3—104.00; Nov. 4—104.00; Nov. 7—104.00; Nov. 8—104.00*.

*Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in OCTOBER based on quotations appearing in THE IRON AGE, were as follows:

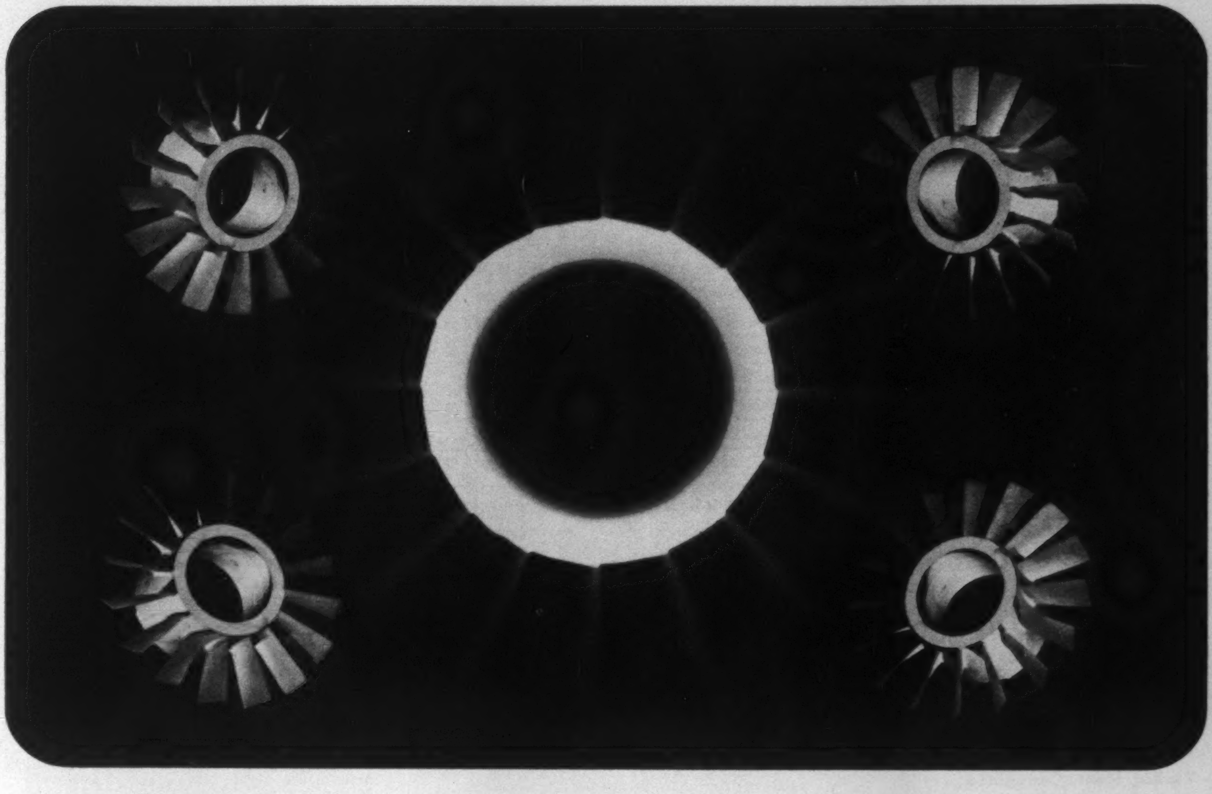
Electrolytic copper, del'd	
Conn. Valley	31.05
Copper, Lake	31.05
Straits, Tin, New York	103.275
Zinc, E. St. Louis	13.00
Lead, St. Louis	11.80
Aluminum ingot	26.00

Note: Quotations are on going prices

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	30.00	33.00	10/11/60
Copper (CS)	30.00	31.00	10/13/60
Copper (L)	30.00	33.00	10/13/60
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium Ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/6/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig Velasco, Tex. **NICKEL:** Port Colborne, Canada. **ZINC:** prime western. **TIN:** See above; Other primary prices, pg. 246.



Pinwheels for an Inferno

Turbine wheels in today's jet engines face intense heat and ultra-precise operating requirements. Austenal's Microcast Division checks them for soundness with radiography using Kodak Industrial X-ray Film, Type AA

Whirling at fantastic speeds at white heat is no sissy job. It takes castings molded to utmost accuracy to stand up dependably in a powerful jet.

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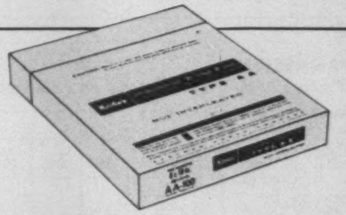

Read what Kodak Industrial X-ray Film, Type AA, does for you:

- Speeds up radiographic examinations.
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- Provides excellent uniformity.
- Reduces the possibility of pressure desensitization under shop conditions.

Kodak
TRADE MARK

EASTMAN KODAK COMPANY
X-ray Division Rochester 4, N. Y.

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/8
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand, Grade	......	67.9	69.0	77.9	103.1
AZ31B Spec.	......	93.3	96.9	108.7	171.3
Tread Plate	......	70.6	71.7	......	......
Tooling Plate	73.0	......	......	......	......

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	....	52.36	56.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	51.75	52.04	51.69	55.81
Brass, Red	52.62	52.91	52.56	56.68
Brass, Naval	54.08	60.39	47.89	58.24
Muntz Metal	52.14	....	47.45	....
Comm. Bz.	54.03	54.32	53.97	57.84
Mang. Bz.	57.82	....	51.42	....
Phos. Bz. 5%	75.70	75.70	76.20	77.63

Free Cutting Brass Rod	34.88

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.	29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be	$65.00
Beryllium copper, per lb conta'd Be	$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading	$70.00
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.50
Calcium, 99.9% small lots	$ 4.55
Chromium, 99.8% metallic base	$ 1.31
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Germanium, per gm, f.o.b. Miami, Okla., refined	$29.95 to $36.95
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$75 to $85
Lithium, 98%	$9.00 to $12.00
Magnesium sticks, 10,000 lb.	57.00
Mercury, dollars per 76-lb flask f.o.b. New York	$208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel	69.60
Palladium, dollars per troy oz.	$24 to $26
Platinum, dollars per troy oz.	$82 to $85
Rhodium	$137 to $140
Silver ingots (¢ per troy oz.)	91.375
Thorium, per kg.	$43.00
Vanadium	$ 3.65
Zirconium sponge	$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	28.25
No. 120	27.25
No. 123	26.25
80-10-10 ingot	
No. 305	32.75
No. 315	30.50
88-10-2 ingot	
No. 210	40.50
No. 215	37.25
No. 245	32.50
Yellow ingot	
No. 405	23.50
Manganese bronze	
No. 421	27.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	24.25-24.50
0.60 copper max.	24.00-24.25
Piston alloys (No. 132 type)	26.00-27.00
No. 12 alum. (No. 2 grade)	22.75-23.25
108 alloy	23.25-23.75
195 alloy	25.75-26.75
13 alloy (0.60 copper max.)	24.00-24.25
AXS-679 (1 pct zinc)	23.00-24.00

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½%	23.75-24.75
Grade 2—92-95%	22.50-23.50
Grade 3—90-92%	21.50-22.50
Grade 4—85-90%	21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	20⅜	18⅜
Red brass	23¼	22½
Comm. bronze	24	23¼
Mang. bronze	19⅛	18⅜
Free cutting rod ends.	19⅝	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24½
No. 2 copper wire	22½
Light copper	20¼
*Refining brass	20½
Copper bearing material	19

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	23¾
No. 2 copper wire	22¼
Light copper	20
No. 1 composition	19½
No. 1 comp. turnings	19
Hvy. yellow brass solids	15
Brass pipe	14
Radiators	16
Aluminum	
Mixed old cast.	13 —13½
Mixed new clips	14½—15
Mixed turnings, dry	13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	21½—22
No. 2 copper wire	19½—20
Light copper	17½—18
Auto radiators (unsweated)	12½—12¾
No. 1 composition	16½—17
No. 1 composition turnings	15¼—15¾
Cocks and faucets	12¾—13¼
Clean heavy yellow brass	11¾—12¼
Brass pipe	13¼—13¾
New soft brass clippings	13½—13¾
No. 1 brass rod turnings	12½—12¾

Aluminum

Alum. pistons and struts	6½— 7
Aluminum crankcase	8½— 9
1100 (2s) aluminum clippings	10 —10½
Old sheet and utensils	8½— 9
Borings and turnings	4½— 5
Industrial castings	9 — 9½
2020 (24s) clippings	10 —10½

Zinc

New zinc clippings	7 — 7¼
Old zinc	4 — 4½
Zinc routings	3 — 3¼
Old die cast scrap	2 — 2¼

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	23-23.50
Clean Monel turnings	16.50-17
Old sheet Monel	22-23
Nickel silver clippings, mixed.	18
Nickel silver turnings, mixed.	15

Lead

Soft scrap lead	8 — 8¼
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	79 —80
No. 1 pewter	59 —60
Auto babbitt	43 —44
Mixed common babbitt	10¼—10¾
Solder joints	14½—15
Siphon tops	41
Small foundry type	9¾—10¼
Monotype	9¾—10¼
Lino. and stereotype	8¾— 9
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	2¼— 2¾
Electro dross	2¼— 2¾

(Effective Nov. 8, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP						
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Nov. 8, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Thin Tinplate (electro)
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for 0.50 lb. base box for 0.45 lb. deduct 15¢; for 0.55 lb. add 15¢; for 0.60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*	Holloware Enameling 29 ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.		
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *F2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets.

(Effective Nov. 8, 1960)

†† 7.425 at Sharon; Niles is 7.225.

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	**Bethlehem, Pa.**				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*		7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	**Alton, Ill.**	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 C9									8.10 C9
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	**Emeryville, Fontana, Cal.**	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 C7			7.95 C7	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 C6	6.125 C6					6.15 C6				8.25 C6
	Portland, Ore.	6.425 O2	6.425 O2									
	San Francisco, Niles, Pittsburg, Cal.	6.375 C7 6.425 *B2*	6.375 C7 6.425 *B2*				9.05 *B2*					8.95 C7,C6
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	**Atlanta, Ga.**	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Nov. 8, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co..
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities		Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
	City Delivery‡ Charge	Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta	......	9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	......	......	......	......
Baltimore**	$.10	7.87	9.71	10.16	10.78	8.44	9.13	8.65	11.90	17.48	16.48	21.58	20.83
Birmingham**	......	8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	......	......
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.03	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	......	......	......	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**	......	9.22	9.65	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**	......	9.59[1]	11.29	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.20	......	11.39	8.81	9.16	8.97	12.89	......	......	......	......
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	......	......	8.90	8.65	9.20	8.90	10.70	......	......	......	......
Philadelphia**	.10	8.45	9.70	11.50	10.95	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.03	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	21.20	20.45
Portland**	......	9.45	11.30	12.35	11.45	9.60	10.80	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**	......	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.84	10.99	11.16	8.83	9.33	8.97	11.64	......	16.69	......	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84."; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Nov. 8, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50		
Birmingham *W9*	62.00	62.50*	66.50		
Birmingham *U4*	62.00	62.50*	66.50		
Buffalo *R3*	66.00	66.50	67.00	67.50	
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	
Chester *P2*	68.00	68.50	69.00		
Chicago *I4*	66.00	66.50	66.50	67.00	
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50			
Geneva, Utah *C7*	66.00	66.50			
Granite City *G2*	67.90	68.40	68.90		
Hubbard *Y1*			66.50		
Ironton, Utah *C7*	66.00	66.50			
Lyles, Tenn. *T3*					73.00
Midland *C11*	66.00				
Minnequa *C6*	68.00	68.50	69.00		
Monessen *P6*	66.00				
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*		66.50	67.00	67.50	
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00		66.50	67.00	
So. Chicago *R3*	66.00	66.50	66.50	67.00	
So. Chicago *W8*	66.00		66.50	67.00	
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66-00	66.50	66.50	67.00	
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*			66.50		

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)	
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount	
	Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	29.50 32.75	33.25	29.50 34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* wensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount	
	Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium..					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Nov. 8, 1960)

MERCHANT WIRE PRODUCTS

	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld	Merch. Wire Galv.
F.o.b. Mill	Col	Col	Col	Col	Col	¢/lb.	¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*						9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*						9.00	9.55
Chicago *W7*	173					9.00	9.55†
Cleveland *A6*							
Cleveland *A5*						9.00	
Crawf'dsv. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡						
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo C9*	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****						9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*						9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*			...	236		9.95	10.50
SparrowsPt. *B3***	175		...	215	198	9.10	9.775
Struthers, O. *Y1**						8.65	9.20
Worcester *A5*	179					9.30	9.85
Williamsport *S5*							

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50	......	......	......	......	......	......	......	......
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50	......	......	......	......	......	......	......	......
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Fontana *K1*	+6.25	......	+2.25	......	0.75	......	1.25	......	1.75	......	2.25	......	2.75	......	......	......	......	......	......	......	......	......
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50	......	......	......	......	......	......	......	......
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

stack-molding
gives you lower-cost castings

This 2¼-pound gray iron casting is a generator part for an automotive electrical system.

COSTS were CUT by casting 60 at a time . . . 5 to a mold . . . 12 molds high.

If you have high-volume requirements for fairly flat parts . . . investigate STACK-MOLDING.

to fill your IMMEDIATE NEEDS for QUALITY PRECISION CASTINGS at LOWER COST

Contact . . .

RELIABILITY . . . Uniformly high quality, with dependable composition and structure.

ACCURACY . . . Maintenance of close tolerances reduces production costs.

HIGH STRENGTH . . . Heat-treating facilities available to provide any desired properties.

OVERNIGHT DELIVERY WITHIN 500 MILES

GL GREAT LAKES FOUNDERS & MACHINE CORP.
LUDINGTON, MICH.
Specialists in Stack-, CO₂, and Shell-Mold Casting

DYKEM
STEEL BLUE®
Stops Losses
making Dies and Templates

DYKEM
STEEL BLUE
SPECIMEN
With DYKEM Steel Blue
Without DYKEM Steel Blue

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

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HI-SPOT
BLUE
NO. 107

CUT SCRAPER TIME
END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

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GOSS and DE LEEUW
MULTIPLE SPINDLE
CHUCKING MACHINES
Tool Rotating
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si...	26.00
4-6% C, 58-63% Cr, 3-6% Si........	22.50
5-8% C, 58-63% Cr, 3-6% Si........	22.50
6-8% C, 50-56% Cr, 4-7% Si........	22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si..	28.75
0.025% C (Simplex)	35.00
0.010% C max, 63-66% Cr, 5-7% Si.	34.50
0.25% C max	33.50
0.010% C max, 68-71% Cr, 2% Si max	34.50
0.25% C max	33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C	$1.29
9 to 11% C, 88-91% Cr, 0.75% Fe...	1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.15
Ton lots	1.17
Less ton lots	1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	24.50	14.60
Ton lots	29.75	16.05
Less ton lots	31.35	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk	24.00
Ton lots	27.95
Less ton lots	29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk	23.00
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	21.15
Less ton lots	22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	18.45
Ton lots	19.95
Less ton lots	21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk	19.20
Ton lots to carload packed	21.15
Less ton lots	22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	13.70
Ton lots packed in bags	16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	Palmerton, Pa. 35 lb, down	Neville Is., Pa. 35 lb
16-19%	$98.00	$96.00	$100.50
19-21%	100.00	98.00	102.50
21-23%	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk	34.25
Ton lots, palletized	36.25
250 to 1999 lb	39.00
Premium for Hydrogen - removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn	24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% (Bulk) P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk	11.60
Ton lots, packed	13.25
Carloads, bulk, delivered, per lb of briquet	14.00
Briquets, packed pallets, 2000 lb up to carloads	16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	8.00
Ton lots, packed	10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
90% Si....	20.00		

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth	3.20
Crucible	3.30
High speed steel	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb...	2.40	3.30	4.55

(Effective Nov. 8, 1960)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.

Carloads, bulk	9.85¢
Ton lots	11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo	$1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb

Ton lots	$3.45
Less ton lots	3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta	$3.40
Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo..	$1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage,

per gross ton	$120.00
10 tons to less carload	$131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti	$1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots,

per lb contained Ti	$1.50
Less ton lots	$1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton	$255.00
Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered	$2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth,

Pa.	$1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa.	$1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5	$1.38

Zirconium silicon, per lb of alloy

35-40% del'd, carloads, bulk..	26.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload	$5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound	30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound	18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots...	$1.20

F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots (packed)	$1.46
Less ton lots (packed)	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots	2.15

VARIABLE VOLTAGE DRIVES
3 PHASE 60 CYCLE

Quan. Size Description
2—3000 HP DC MOTORS—525 V. 600 RPM Whse. M. G. Sets—2500 K.W. Whse., 2300/4160 V.
1—2750 HP DC MOTOR 450 V. 300 RPM Elliott 2200 K.W., Gen. Elec. 3 unit 450 V. DC Gen. with 3000 H.P. 720 RPM, 2300 V. AC Motor and Etc.
1—2250 HP DC MOTOR 600 V. 400/500 RPM, G.E. M.G. Set—2000 K.W. G.E. AC Motor—2300 V.
1—1500 HP DC MOTOR 600 V. 600 RPM Whse. M. G. Set. 1500 K.W. G.E. 13,200 V.
1—1500 HP DC MOTOR 600 V. 300/700 RPM Whse. M.G. Set—1500 K.W. G.E. 13,200 V.
For listing of Motors, Generators, Transformers, M.G. Sets, Rectifiers, Mill Motors, etc.
See last week issue.
Write — Phone — Wire
BELYEA COMPANY, Inc.
47 Howell St., Jersey City, N. J.
Tel. Oldfield 3-3334

RE-BUILDING AT ITS BEST

Checking a Miles re-built lathe for alignment of spindle with bed. Runout is held within .0005" per foot which is substantially below new tool standards.
Automatic, 7½" No. 675 New Britain Gridley 6 spindle chucker
Bulldozer, 180 ton No. 27 Williams-White DBG
Borer, No. 48 Heald Boromatic single end, precision
Broach, 10 ton 66" stroke. Oilgear, double slide, vertical, tydraulic, surface
Cut-off, No. 3 Modern, MD
Drill, Hy. Dy. 20" swing No. 217 Baker Bros. box column
Drill, Deep Hole, W. F. & John Barnes Model 420 horizontal, late
Drill, Multiple, Model B2A Natco holesteel, hydraulic
Drill, Sensitive, 27" swing Leland Gifford 4 spindle, mtr. on spindle
Drill, Driver, 26" swing No. 25 Ex-Cell-O vertical hydraulic box column
Gear Chamferer, Sheffield Model 343, type C, new December 47
Grinder, Centerless, No. 12 Landis
Grinder, Cylindrical, 22" x 72" Landis type C plain hydraulic
Grinder, Internal, No. 271 Heald plain, swivel work head
Grinder, Internal, No. 24-36 Bryant hole grinder
Grinder, Surface, 12" x 12" x 48" Thompson
Grinder, Thread Model 33 Ex-Cell-O automatic precision
Keyseater, No. 3 Baker
Lathe, Automatic, Model 3D Gisholt Simplimatic, hard ways, late
Lathe, Engine, 25" x 72" cc 12' 9" bed Axelson Model E, hy. dy. geared head
Lathe, Production, 15" x 30" cc Lipe Carbomatic, hydraulic
Lathe, Turret, No. 2 Warner & Swasey with new electric bar feed
Lathe, Turret, No. 4L Gisholt hy. dy. saddle type, cross feeding turret
Lathe, T Model, 60" Model T Lodge & Shipley right angle chucking
Mill, Duplex, No. 5/48 Cincinnati hydromatic bed type
Mill, Boring, 60" Colburn vertical
Mill, Knee Type, No. 2 Cincinnati high speed, dial type, late
Bolt Mach., type KK Economy automatic bolt head shaving and pointing
Bolt Mach., type R Economy automatic threading or pointing
Planer, 36" x 36" x 12' Gray, extra heavy pattern, double housing
Press, Coining, 600 ton No. 664 Toledo knuckle joint, tierod
Press, Double Crank, 72 ton Model 45G48-22 Cleveland gap frame, SBG
Contract rebuilding of your used machinery
OVER 1,000 NEW AND USED MACHINE TOOLS IN STOCK
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2041 EAST GENESEE • SAGINAW, MICH. PL. 2-3105

THE CLEARING HOUSE

Philadelphia Dealers Are Optimistic

Used machinery dealers in the general Philadelphia area are, for the most part, optimistic.

With the presidential election over, they believe customers will start spending again.

■ Used machine dealers in the general Philadelphia area are beginning to become optimistic about fourth quarter possibilities.

Most of the optimism appears to stem from the fact that the presidential election is now over. Dealers say that many customers were adopting a "wait-and-see" attitude prior to the elections.

"Now that it's over," says one dealer, "orders should start coming in. If this is true, the fourth quarter could be the shot-in-the-arm we need here to make 1960 a good year."

Another dealer says that business should be "spotty" at the worst through November and December.

Customers Are Available—The general consensus is that customers are available with money to invest in good used machinery. A Camden, N. J. dealer notes, "It's basically simple. The customers are available, though they aren't beating a path to your door. If you have the machinery and the right price tag, you can do business."

He adds, "And by 'right price tag,' I don't mean there's a need to cut prices to the bone. Customers are willing to negotiate and you can come out ahead most of the time."

A dealer in Allentown says activity picked up considerably in October and looks "very good" for this month.

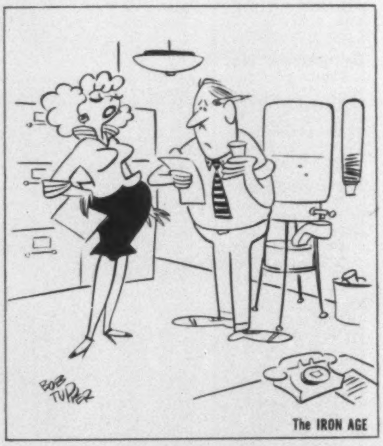
Among the items moving are power plant equipment, air compressors, diesel generator sets and boilers.

Not All Are Happy—However, not all dealers are happy.

One in a suburban Philadelphia district reports sales are still "going downhill." He says, "I have tried everything this side of giving my stuff away, but there just aren't any interested buyers." This particular dealer believes blaming October "slumps" on pre-election jitters is a case of "dealers trying to sell themselves on a good reason."

"If buyers want your machinery for expansion or new contracts," he notes, "the outcome of the election would have had little to do with their holding off. They just don't want to buy."

Very few used machine men contacted felt that the recent Machine Tool Exposition in Chicago influenced sales.



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TUESDAY & WEDNESDAY NOVEMBER 29 & 30, 1960
10:30 A.M. Each Day
Inspection November 1 to Sale Date

$5,000,000 EVALUATION
MAJORITY MACHINES INSTALLED NEW SINCE 1950
ONE OF AMERICA'S FINEST FACTORIES

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Billet Shear, Presses, Air Compressors, Heat Treat, Cranes, Sand Blast, Hydraulic Systems, Electric Sub-Stations, Lathes, Turret Lathes, Grinders, Drills, Milling Machines

Highlighting . . .

#15 Buffalo Billet Shear—22"x 3" or 8" Round Cap.—New 1952.
5—Worthington 1000 CFM Air Compressors—New 1948.
350 Ton Lake Erie Hydraulic Press—New 1957.
7—#3 Cincinnati Centerless Grinders—New 1947.
3—15 Ton P & H Overhead Electric Traveling Cranes—New 1950
Over 200 New Diamond Grinding Wheels
Plus hundreds of other related items.

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

"PACKAGE DRIVES"
FOR ROLLING MILLS & REELS

(1)—3000-HP G.E. Motor, 90/180 R.P.M.
(1)—3000-KW Allis-Chalmers, 600-VDC, M-G Set, with 5000-HP Motor, 13800/6900/4160-Volt.

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(1)—1500 HP Westinghouse Motor, 300/700 R.P.M. and
(1)—1250-KW M-G Set, 600-VDC with 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(1)—1400-HP G.E. Motor 165/300 R.P.M. and
(1)—1200-KW M-G Set, 250-VDC with 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(2)—750-HP Westinghouse Motors, 300/700 R.P.M. and
(1)—3-unit M.G. Set—(2) 600-KW Generators and 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(2)—235-HP Westinghouse Motors, 325/975 R.P.M.
(1)—500-KW Westinghouse M.G. Set, 250-VDC, with 700-HP Motor, 2300/4000-Volt OR
(1)—3-unit Westinghouse M.G. Set with (2) 250-KW Generators and 700-HP Motor, 2300/4000-Volt.

All M.G. Set Drive Motors are Synchronous, 3-phase, 60 cycle. Will sell any of these items separately.

Can furnish any type of Starting Equipment for the Synchronous Motors, necessary exciter sets and D.C. Motor Control.

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THREAD MILLING MACHINES
10x48" Hanson & Whitney Universal Semi-Automatic, m.d.
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12x54" Lees-Bradner Universal Type, m.d.
12x102" Lees-Bradner Universal Type, m.d.
Model HT—12x102" Lees-Bradner Universal Type, m.d.
No. 40 Lees-Bradner Automatic Universal m.d., late
No. 44MB Wickes Smalley General, late model, 1953

UNIVERSAL MILLING MACHINES
No. 2MH Cincinnati, m.d., late
No. 3A Brown & Sharpe Standard Type, m.d., late
No. 22LU Van Norman Ram Type, m.d.

VERTICAL MILLING MACHINES
No. 08 Cincinnati, m.d., latest
No. 1-14 Kent-Owens, m.d.
No. 2 Brown & Sharpe Light Type Swivel Head, m.d.
No. 2H Kearney & Trecker, m.d.
No. 2K Kearney & Trecker, m.d.
No. 3 Kearney & Trecker Standard, m.d.
No. 3V Van Norman, m.d., 1943
No. 3VG Reed Prentice Vertical Miller & Die Sinking Machine, m.d.
No. 40 W. B. Knight, m.d.
28-60" Cincinnati Vertical Hydro-Tel Miller, m.d.
No. 9J Gorton Vertical Miller & Duplicator, m.d.

PIPE MACHINES
No. 999 Toledo Pipe Machine, m.d.
3" to 10" capacity Horizontal Pipe Flanging Machine

PLANERS
30"x30"x10' Cincinnati, belted m.d., 2 heads
36"x36"x8' Cincinnati, m.d., 2 heads on rail
36"x36"x12' Betts, m.d., 3 heads
36"x36"x12' G. A. Gray, 2 heads
36"x36"x18' table Cincinnati Double Housing, m.d.
36"x36"x20' table Cincinnati H.P. Double Housing, m.d., belted
48"x48"x18' Niles-Bement-Pond, 2 heads, belt
48"x48"x28' Cincinnati, reversing m.d., 4 heads
56"x42"x14' Cincinnati, belt drive, 2 heads
60"x60"x12' table Cincinnati Openside, m.d., 2 heads on rail, right hand side head

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times

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BELOW AUCTION PRICES — UNDER POWER
LATE MODELS—MONEY BACK GUARANTEE

2000 Ton Clearing Hydr. Press 56"x72", 250 HP, '43
1500 Ton Verson KJ Coining Press, Air Clutch, '43
1300 Ton Nat'l "Maxipres" 10" Str. Air Cl. '55
920 Ton Bliss-Tol. #60, 47"x72", Str. 20" Air Cl. '43
700/390 Ton Tol. 797E DA Tog. 127½x83" Bed
600 Ton Ferracute #E601 KJ Coining Press '50
440 Ton Bliss #210, Side Shear, Air Cl. Str. 16", '53
440 Ton Toledo #59¼, 41"x48", Str. 12", Air Cl.
350 Ton Bliss 4C-7 Bed 130"x90", Air Clutch
150 Ton Cleve. 60-D-84, Bed 86"x48", Str. 14"
3000 lb. Chambersburg #30CD "Ceco Drop" Hammer

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WENDER PRESSES INC.

1957C CLAY — TR 2-1270 — DETROIT 11, MICHIGAN

IMMEDIATELY AVAILABLE

Because of Mill Consolidation

3 LEE WILSON RECTANGULAR BELL-TYPE ANNEALING FURNACES

atmosphere-controlled with 9 bases, are available. Each is approximately 7' x 7' x 14'. Excellent when used for manufacture of steel coils they have a capacity of 50 tons per charge. These top-grade furnaces are still set up in the plant. Tremendous values specially priced for prompt sale.

NATIONAL MACHINERY EXCHANGE

126 Mott St. New York 13, N. Y.
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5' x 12 Ga. Whitney Power Shear.
No. 3 Niagara Angle Bending Roll, M.D.
6" x 6" x 1" Cleveland Double Angle Shear.
6' x ⅜" Cincinnati Power Press Brake.
No. ½, No. 1½ Buffalo Univ. Ironworkers, M.D.
600 Ton Southwark Hyd. Inclined Wheel Press.
6' x ¼" Lawn Initial Bending Roll, M.D.

FALK MACHINERY COMPANY

16 Ward St., Baker 5-5887, Rochester 5, N. Y.

ROLLING MILLS—STEEL WORKS EQUIPMENT

1—35" 2-HIGH BLOOMING MILL, with reversing motor, M.G. set, tables, manipulator.
1—3-HIGH PLATE MILL 40" & 26½" x 112".
1—34" & 22" x 112" PLATE MILL, 3-high.
1—32" & 20" x 56" 3-HIGH SHEET MILL with motor driven screwdown and pre-set controls.
1—25" & 42" x 66" HOT STRIP MILL, 4-high.
1—18" x 28" COLD MILL, 2-high, 200 HP drive.
1—26" COLD SHEET MILL TRAIN, 6 stands, 400 HP motor and drive.
1—16" x 24" STRIP MILL, 2-high, forged rolls.
1—3½" & 8½" x 5½" STRIP MILL, 4-high.
1—16" BAR MILL, 3-high, single stand.
1—9" BAR MILL, 3-high, five stands.
1—34" x 192" ROLL GRINDER.
1—450 TON DOWN-CUT CROP SHEAR, 14" stroke, length of knives 28".
1—VERTICAL OPEN-SIDE BAR SHEAR, 28" knife, capacity 1" x 24" or equal.
1—HYDRAULIC DIVIDING SHEAR, capacity 5" x 5¼" hot steel.
1—SHEAR, 1" x 110" plate.
2—SQUARING SHEARS for ¼" x 156" sheets.
2—SQUARING SHEARS for 10 ga. x 120" sheets.
1—ROLLER LEVELLER, 1" x 144" plate.
5—LEVELLERS for sheets, 17 rolls, widths 48", 54", 66", 72".
1—AUTOMATIC SQUARING SHEAR UNIT for sheets, 162" side cut, 72" end cut.
1—UP-COILER for non-ferrous strip, up to 90" wide.
1—ROLL LATHE, ENCLOSED HEADSTOCK, up to 40" dia. rolls.
1—BILLETEER, size C, for conditioning billets from 3" to 12" square, up to 18' lengths.
1—MAGNETIC SEPARATOR, double pulley, Stearns.
1—SLITTER FOR SHEETS up to 144" wide.
1—SIDE TRIMMER for non-ferrous sheets ¼" thick up to 100" wide.
1—CORRUGATING MACHINE for sheets 144" long, 3 sets of removable dies.
1—HALLDEN STRAIGHTENING AND CUTTING-OFF MACHINE, capacity 5/16" to ⅝" dia. x 14 ft.
1—POINTER, tube 2" O.D. x ¼" wall maximum.
1—1500 HP GEAR DRIVE, ratio 8 to 1.
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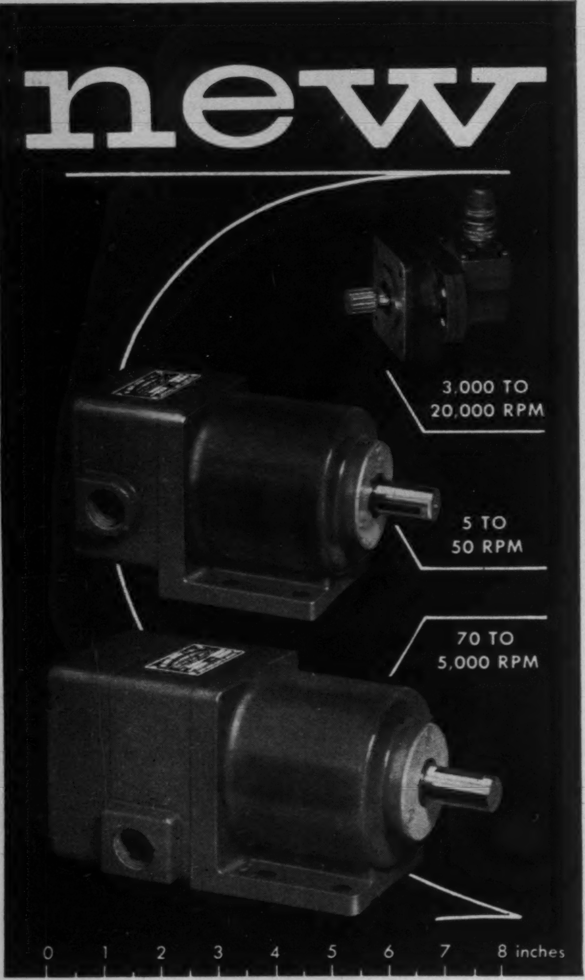

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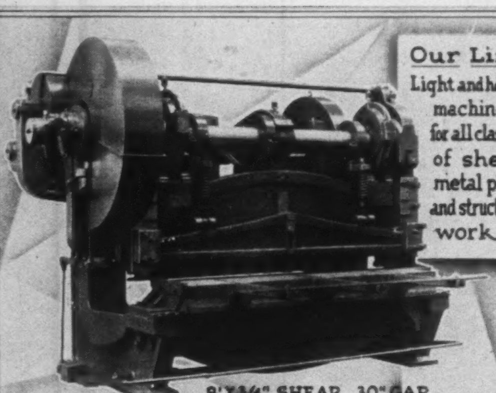
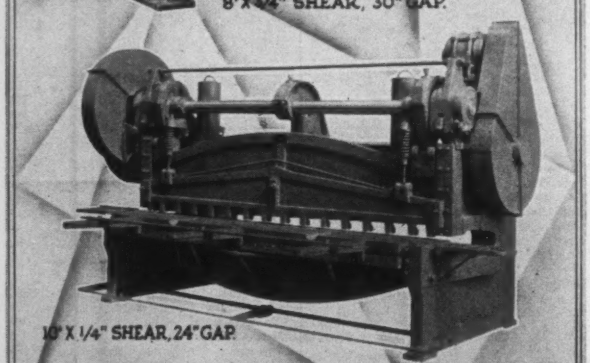


8' X 1/4" SHEAR, 30" GAP.



10' X 1/4" SHEAR, 24" GAP.

BERTSCH & COMPANY
CAMBRIDGE CITY INDIANA

evidence of an evolution in steel processing

Here's a demonstration that sparked a revolution in steel processing. By slipping a piece of tissue paper through a model of an open coil we show how the gases get to the complete surface of the coil at once. This makes possible the exciting process of gas alloying by which carbon or nitrogen can be added or removed during the annealing operation. Called the most revolutionary advance in steel processing in our generation, its potential is unlimited. You can get complete data by calling in your Lee Wilson sales engineer or by writing direct.

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MAKE THE BEST METALS BETTER

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OPEN COIL AND SINGLE STACK FURNACES

Press Forming of Heavy Gauge Truck Brake Mounting Plate

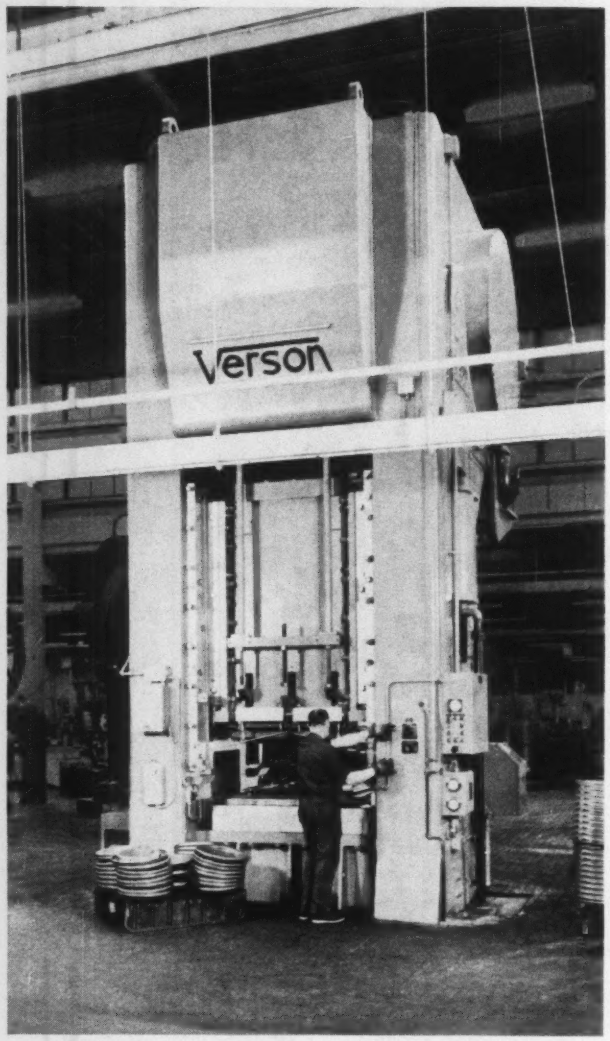
Forming of heavy gauge truck brake mounting plates at The American Stamping Company in Cleveland has been reduced to a simple draw and restrike operation by a 1500 ton Verson Press.

Sometimes called a "backing plate," the piece part is fabricated from a blank 1/4″ thick by 19 7/8″ in diameter. Although the draw operation requires considerably less than the capacity of the press, the nature of the restrike operation requires full press capacity to obtain the necessary profile accuracy.

Of particular interest is American Stamping's use of Verson's mechanical tonnage indicator as a die setting tool. As a result, dies can be set entirely by direct readings on the tonnage indicator without the time consuming custom of trial and error or concern for the die setter's judgment. The tonnage indicator will also warn of overloads as well. This is particularly helpful in view of American Stamping's use of this press on a wide variety of other applications.

Another Verson Press of 500 ton capacity is also used to form in similar manner the backing plate for one of the new compact cars. The material in this case is .109″ thick and 11 3/4″ in diameter. Aside from piece part configuration, forming procedure is the same as for the truck backing plate.

You can find out more about this press application or any other Verson presses or production processes from your Verson Representative. For specific recommendations on your requirements, send an outline of your needs.



Press Specifications

Capacity: 1500 tons
Area of Bolster: 54″ x 60″
Strokes per Minute: 10
All lubrication of the press is automatic. Bed is equipped with Verson pneumatic die cushion.

241-AC

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VERSON ALLSTEEL PRESS CO.

Verson

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